

BASIC SCIENCE

Part - 2

Standard V



Government of Kerala
Department of Education

State Council of Educational Research and Training (SCERT), Kerala
2016

The National Anthem

Jana-gana-mana adhinayaka, jaya he
Bharatha-bhagya-vidhata.
Punjab-Sindh-Gujarat-Maratha
Dravida-Utkala-Banga
Vindhya-Himachala-Yamuna-Ganga
Uchchala-Jaladhi-taranga
Tava subha name jage,
Tava subha asisa mage,
Gahe tava jaya gatha.
Jana-gana-mangala-dayaka jaya he
Bharatha-bhagya-vidhata.
Jaya he, jaya he, jaya he,
Jaya jaya jaya, jaya he!

PLEDGE

India is my country. All Indians are my brothers and sisters.

I love my country, and I am proud of its rich and varied heritage. I shall always strive to be worthy of it.

I shall give respect to my parents, teachers and all elders and treat everyone with courtesy.

I pledge my devotion to my country and my people. In their well-being and prosperity alone lies my happiness.

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Dear children,

This book is your friend;
a friend who
asks you questions,
enlightens you with knowledge,
persuades you to keenly observe, know and search;
always a friend at your service.

Let us discover the science within the wonders seen around.
You will be able to soar into the sky of knowledge,
evoking nature's grace into your minds.

This book will accompany you
helping you to learn what you ought to,
persuading you to search for more, and
showing you what you imagined.

March ahead holding your teachers' hand
and discovering along with friends.

Regards

Dr. J. Prasad
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**Certain icons are used in this
textbook for convenience**



**For further reading
(Evaluation not required)**



ICT possibilities for making concepts clear



Significant learning outcomes



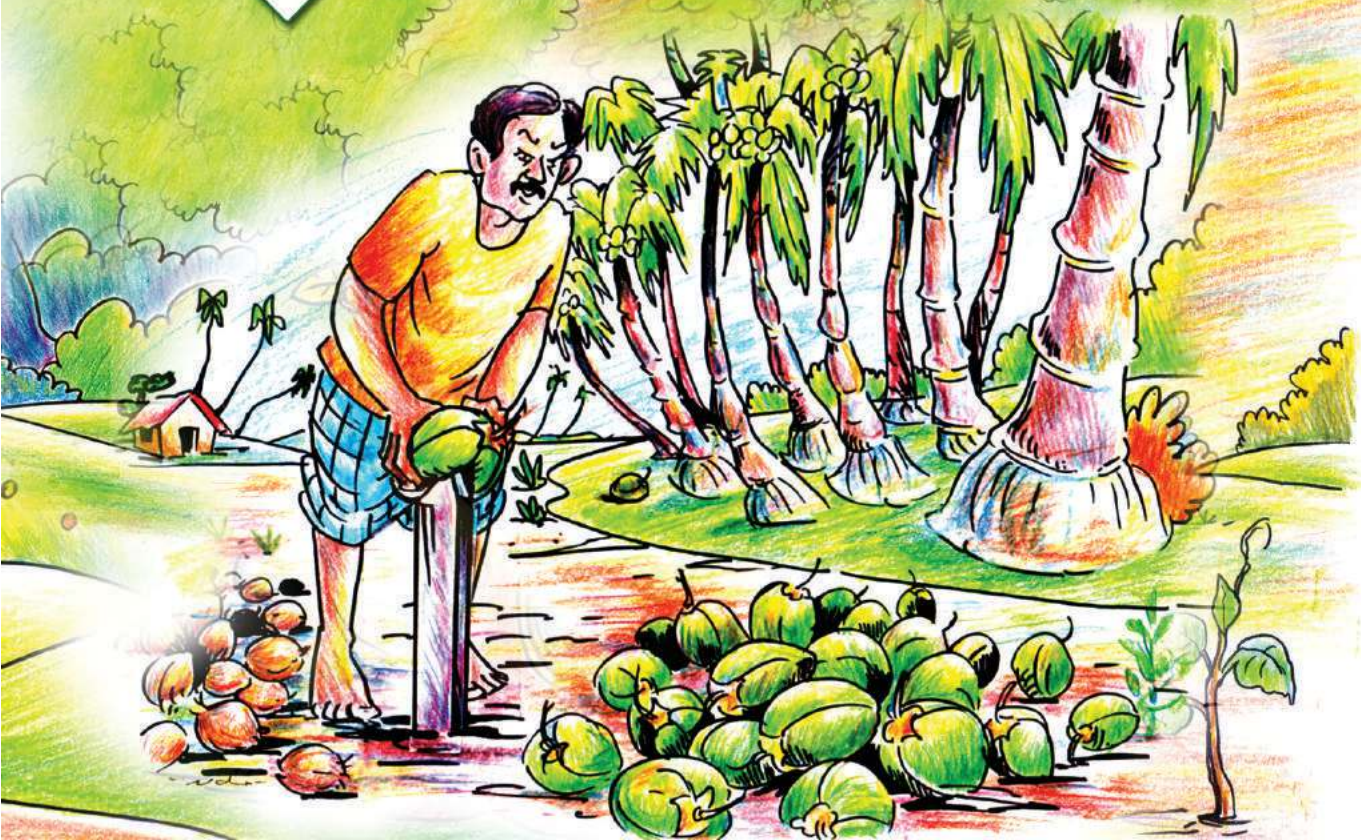
Let us assess



Extended activities

6

A Little Effort, Lot of Work



Did you see Paramu chettan husking coconuts?

What are the different ways in which you husk coconut at home?

- Using an axe
- Using a chopper
- Using the coconut husking device

Which of these methods is most commonly used? Why?

Write down your opinion in the science diary.

Didn't you choose this device because it makes your work easier?

Such devices that make any work easier are known as simple machines.

Don't you use other simple machines also at home?

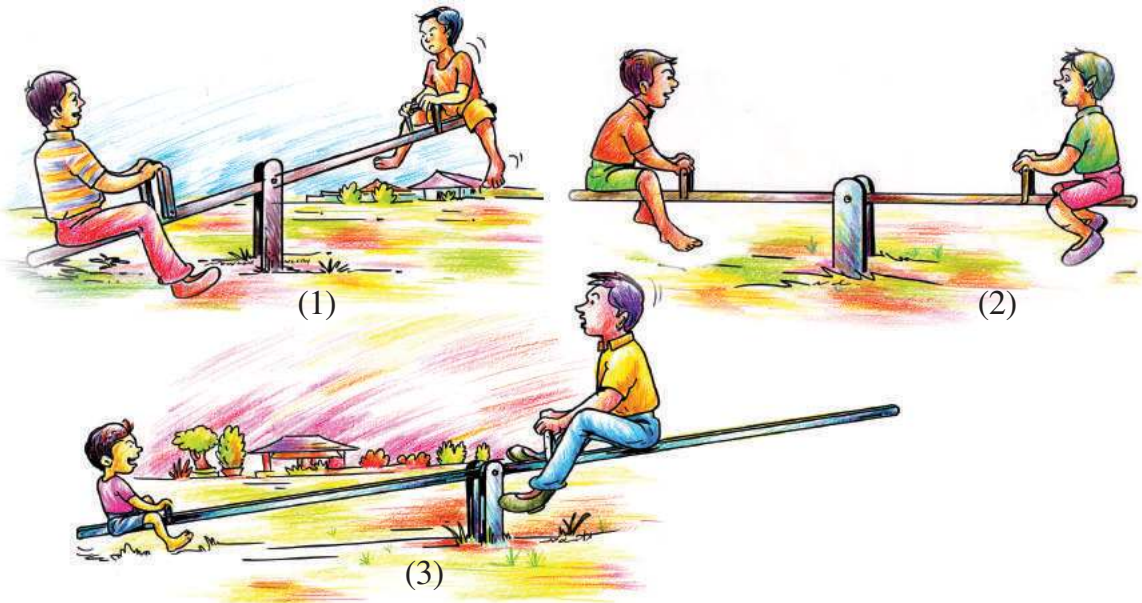
Look at the pictures of some simple machines.



Tabulate in your science diary the tasks made easier by these devices.

Simple machines	Tasks made easy
<ul style="list-style-type: none"> • Hammer • • • 	To pluck a nail

Observe the children playing on seesaw.



On the first seesaw, the bigger boy has easily lifted up the small child.

You see the two children balancing each other on the second seesaw.

Don't you see that the small child has easily lifted up the bigger boy on the third seesaw?

We can find out why this happens observing the position of the child and the hinge on which the seesaw turns.

Include your inference in the science diary.

We use strong rods to lift heavy loads and thus reduce our effort. This is possible because the rod is free to move about a fixed point.

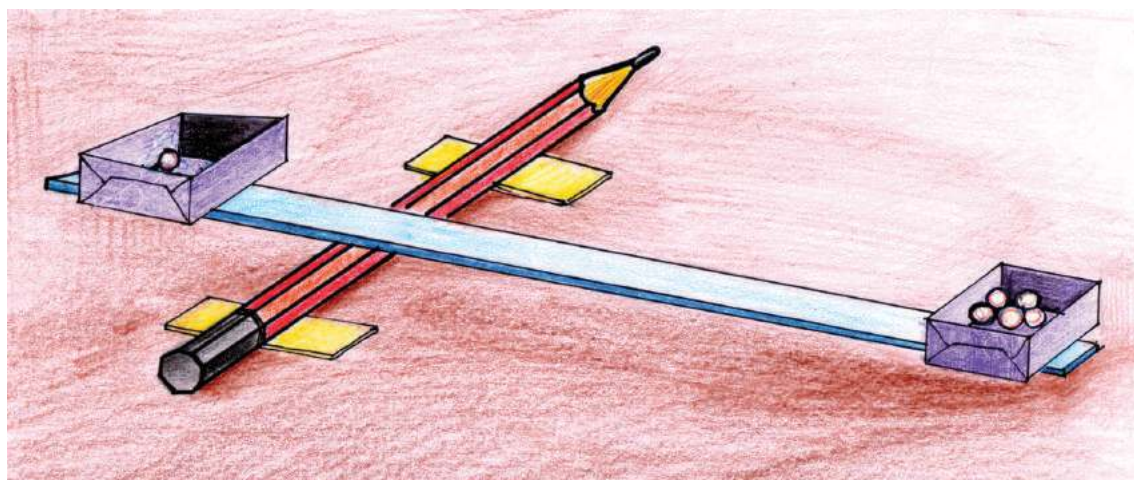
Lever

Lever is a rigid rod that is free to turn about a fixed point. Levers are simple machines because they make our work easier.

Let's make a seesaw

Can you lift five marbles using one marble?

Materials required: A long ruler, two empty match boxes, six marbles, a pencil and a double sided gum tape.



Make a seesaw as shown in the figure.

Place a match box each on either side. Put a marble in one match box and five marbles in the other. Slide the ruler over the pencil as required, to maintain balance.

Slide the ruler again to a position so as to lift five marbles with one marble.

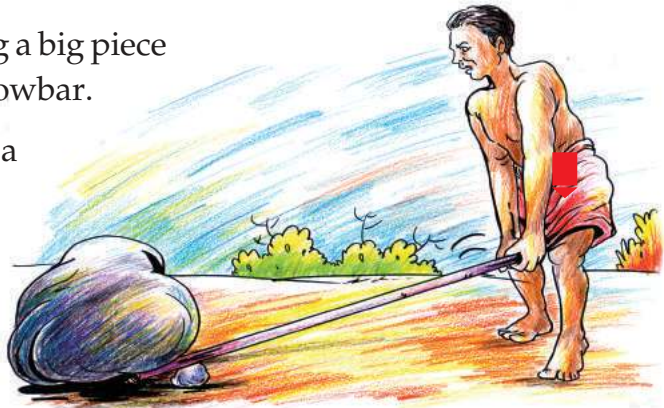
Now the ruler acts as a lever so that a greater weight can be lifted using a smaller weight.

Write the experiment note in your science diary.

Fulcrum, Effort, Resistance

See the picture of a man lifting a big piece of rock with the help of a crowbar.

Here, the crowbar acts as a lever. It is because the crowbar turns about the small stone kept below it that the big stone gets lifted. The point about which a lever turns is called the 'Fulcrum'.



Where do we apply force?

Where did we place the weight to be lifted by force?

The force we apply is called Effort.

The resistive force that is overcome by the effort is called Resistance.

Resistance occurs at the position where the weight of the big stone is experienced. Now observe a pair of scissors. Aren't there two rigid metal pieces turning about the fulcrum? Many of the levers we use have more than one rigid rod or metal piece.

Is the fulcrum of all levers situated between effort and resistance?

Not always. In some levers effort comes in the middle while in others it is resistance.

Mark the fulcrum, resistance and effort in the figures of levers given below.



Stapler



Forceps



Cutting plier



Scissors



Nut cracker



Lemon squeezer

The spoon as a lever!



Observe the pictures. Where on the spoon should you hold in order to open the lid of a tin easily?

Write down your guess in the science diary.

Find out whether your guess is correct through an experiment.

Work can be made easier by adjusting the position of the effort in simple machines.

A spoon is only a kitchen tool. But it acts as a lever when it is used to open the lid of a tin.

We use several objects as levers in our daily life.

Simple machine to draw water too!



Observe the pictures. Which method of drawing water is easier?

How does the pulley make the work easier?

Discuss using the following hints.

Where do we apply force to lift the bucket in both cases?

Is the force applied in the same direction in both cases?

How does the change in the direction of force help us to make the work easy?

Enlist in your science diary the various situations in which work is made easier with the help of a pulley.

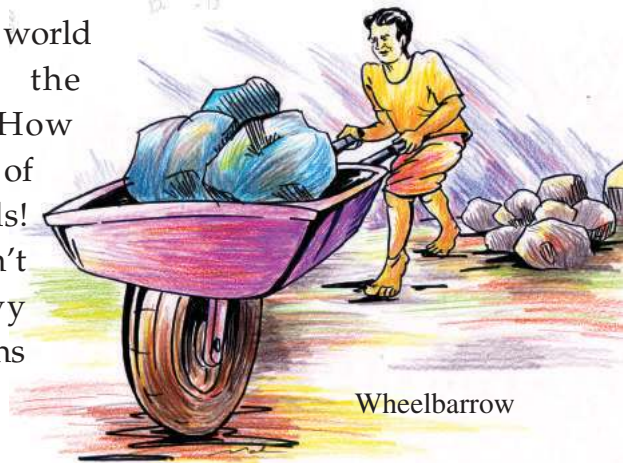
We have familiarized ourselves with simple machines like lever and pulley. We make use of many such simple machines in our daily life.

Wheel and Axle



The invention of the wheel was a big leap in the history of the progress of mankind. Today, we cannot even imagine a world without the wheels. How

great is the service of wheels in the fields of transportation and the transfer of goods! Look at the picture of a wheelbarrow. Isn't it the wheel that helps to move heavy loads? The wheel of the wheelbarrow turns on a rod that acts as an axis.



Wheelbarrow

Haven't you now understood how the wheels of vehicles make our work easier?

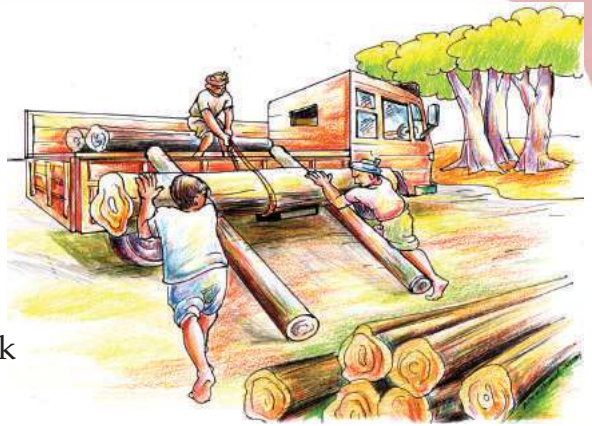


See how a handcart is pulled. There is a rod connecting both the wheels here. This arrangement is the wheel and axle. Discuss how the arrangement of wheel and axle helps the handcart carry heavy loads.

Making use of low-cost materials available in your surroundings, try to make a toy-cart having a wheel and axle arrangement.

Inclined plane

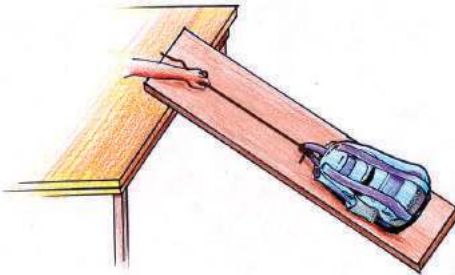
Did you see the simple way in which labourers load heavy logs of wood in a lorry? Big logs of wood kept inclined make the job easier.



Let's do an experiment to understand how an inclined plane makes work easier.

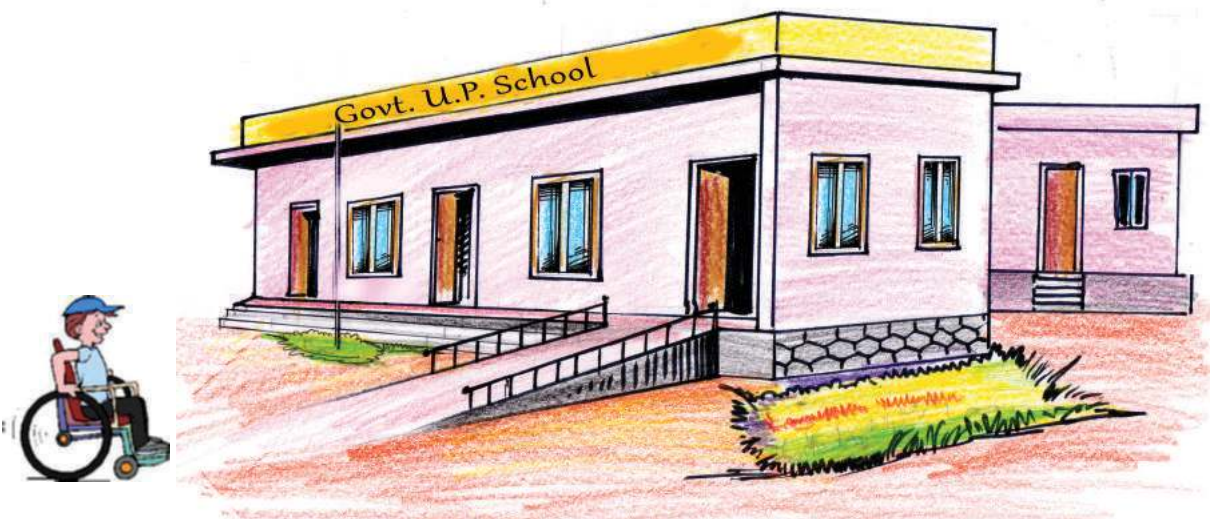
Try to lift with a rope a bag full of books.

Don't you think it is easier when the same bag is lifted along a wooden plank kept inclined?



The wedge used by carpenters is another form of an inclined plane. It is easy to hammer a nail into a wall because the end of the nail has inclined surfaces. Why, do you think, is it difficult to pierce a blunt nail into a wall? Discuss.

We also use many devices made by assembling small simple machines. Nail cutter, cycle, sewing machine etc. are examples of these.



Didn't you notice the picture? Which simple machine's principle is made use of in the ramp?

The ramp at school is highly essential for physically challenged students. Aren't there similar ramps at your school? Hope you realise the need to construct such ramps in public institutions.



Observe the pictures. Different types of wedges are used in both these instances. They are used to tighten wooden frames and to cut wood. There is an inclined surface for this in the first wedge while there are two inclined surfaces in the second one. Discuss the convenience of using wedges in these two situations.

Won't you now try to avail the service of simple machines to reduce your effort in strenuous works?



Significant learning outcomes

The learner can

- understand that there are several devices that make work easy and can cite examples for the same.
- identify real life situations in which simple machines are used.
- use many materials of common use as levers in daily situations.

- bring about necessary changes in levers to make work easier.
- effectively use the pulley, wheel, wheel and axle, inclined plane etc for making work easier.
- explain the importance of ramps and wheel chairs at school.



Let us assess

- 1) A road to the hill top is to be constructed. The distance would be less if a straight road is built. In spite of this, the engineer suggested the construction of a winding road. What may be the reason for this?
- 2) Don't you see the use of a crowbar to reduce workload in the two situations in the pictures? Do you notice any change in the position of effort, fulcrum and resistance in the two situations?



- 3) Find out the levers you use at home and tabulate them as shown below.

Fulcrum in between effort and resistance	Effort in between resistance and fulcrum	Resistance in between effort and fulcrum



Extended activities

- 1) Prepare an album by collecting pictures of different simple machines we use in daily life.
- 2) Visit a workshop in your neighbourhood. Find out the simple machines used there to make work easy.

7

Windows of Knowledge

*How great to see with the eye,
Stars in the sky.*

*How lucky to smell with the nose,
fragrant jasmines at repose.*

*How yummy to taste with the
tongue,
honey-sweet mangoes, to
branches clung.*

*How soft to feel on the skin,
the cool breeze whistling fick-a-fin.*

*How pleasing to hear with the ear,
Mother cuckoo singing near.*

*To touch the glory of the earth
Endowed are we with senses five!*

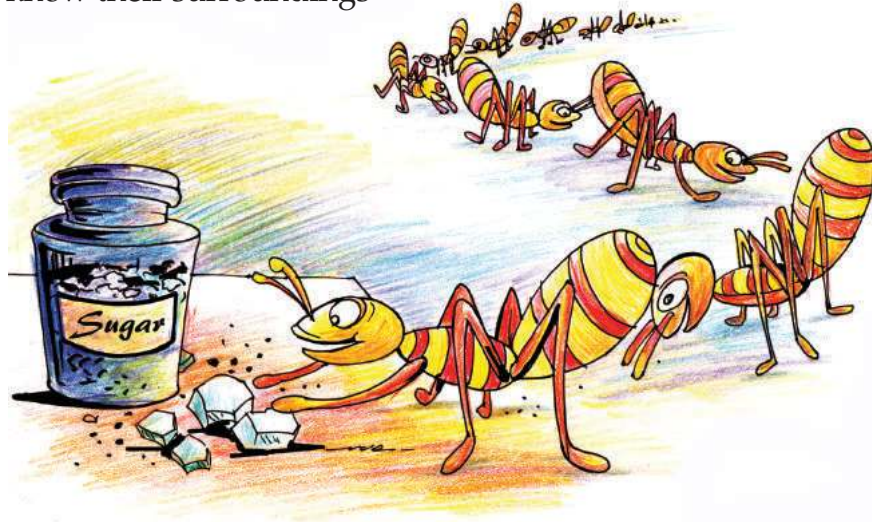
Did you read the poem? How much we learn about nature through our eyes, nose, ear and so on!

Don't other creatures also know their surroundings in this manner?

Have you observed ants searching for food?

How do they come to know about the presence of food?

Haven't you seen eagles carrying away chicks? How does the eagle identify its prey from such heights?



Why does a sleeping dog raise its ears even when we pass by it silently?



How do such creatures identify food by smell, locate their prey and hear even the slightest sounds? Which are the organs that help them to get such information?

Information through eyes

Look at a distant tree. What all information about it do we get through our eyes?

- what type
- how far
- how tall
- how thick
- what colour
- the shape of its leaves
-





We gain most of our knowledge through vision.

What are the parts of the eye that help us to see?

Observe the eye of a child next to you. What are the parts of the eye that you can see?

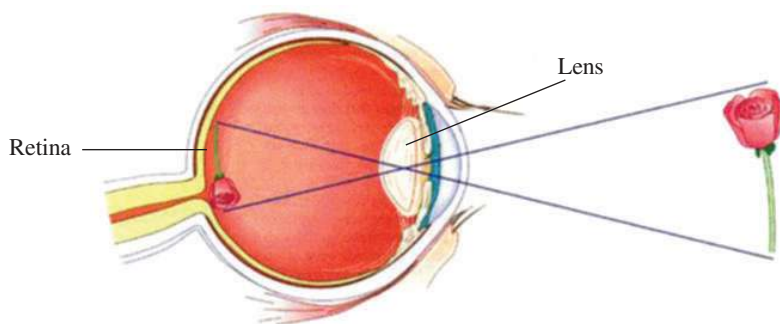
Are eyelids, eyelashes and pupil sufficient for vision?

How do we see?

As seen in the figure, use a hand lens to project the images of various objects on the wall of your classroom. What are the peculiarities of the images?

Just like this, there is a lens in our eye as well. This lens also forms an inverted image of the objects we see with our eyes.

In this activity, the image falls on the wall, doesn't it? But in the eye, the inverted image is formed on the screen known as 'retina'. The optic nerves send this message to the brain. The brain enables the vision of the real erect image.



Compare the experiment you have done to form image using a hand lens with the way we see objects. Note down the details in your science diary. Use the following hints.

- Where do the images form in both the situations?
- What are the similarities of the images?

Why 'two' eyes?

Do these activities.

Try to place the cap on the pen in your friend's hand.

Try to catch a ball thrown up when it comes down.

Try them out keeping both the eyes open and then with one eye shut. In which situation do you experience difficulty?



The ability to see by focusing both eyes on the same point is termed binocular vision. We get an accurate knowledge of the distance and position of objects by this.

Haven't you now understood why it was difficult to do the above activities keeping one eye closed? What other specialities do our eyes have?

- can recognise colours
- three dimensional vision – the ability to know the length, breadth, height, thickness, and distance.

World of the blind

Our eyes open a beautiful world of vision to us, don't they?

Now, keep your eyes closed for some time.

How do you feel?

What may be the plight of the blind?

How do they come to know about the surroundings?

- recognise people through sound.
- identify currency and coins by touch.
-

It is our duty to help the blind. In what ways can you help the blind children in your school?



White cane

White cane is a white stick used by the blind for safe movement. This is a hollow and light aluminium rod. Users can detect the presence of obstacles from the sound produced by the metal portion fixed at the bottom of the stick. It helps others to easily identify the blind and help them.

You can study the map of India by looking at it. What changes can you bring about in a map for those who cannot see? Can't you do something to help them touch and identify state boundaries, mountains and rivers? Can't you make with sand and thread soaked in glue, maps that could be sensed by touch? Such maps are called embossed maps. You also try to make an embossed map.

What different facilities are available to help the blind?

- White cane
- Braille Script
- Tactile watch
- Talking watch



Edubuntu, School Resource see
'kannu thurannu kaanaam'

Eye donation

Many defects of the eye may lead to blindness. Some of them can be rectified by replacing certain parts of the eye. Donating one's eyes after death is called eye donation. If this is to be realised, shouldn't our close relatives be aware that we have signed the consent for eye donation?

Donate your eye and provide light to those in darkness.

"Eye donation – a great donation."

Shouldn't we donate our eyes after death to provide light for the living?

The consent should be signed and given when we are alive. Approach eye banks for eye donation.

Braille Script



This is a script used by the blind to read and write. In this system, the letters are recorded by way of projected



Louis Braille

dots on thick paper, which can be felt by touch. This method was developed by a French man named Louis Braille.

Protection of the eyes

How important our eyes are!

What care should we take to protect them?

- Do not rub or blow if dust falls into the eye; just wash with cold water.
- Do not read in dim light or very bright light or while travelling in a bus.
- Keep a certain distance while watching TV. There must be sufficient light in the room.
- Care should be taken so that chemicals do not fall into the eye.
- Protect your eyes from sharp objects while playing.
-

Hope you have now understood details about the vision of human beings. Now notice the details of vision of some other creatures.

Chameleon



Chameleon's eyes are different from those of other creatures. They can move their two eyes in two different directions and see different sights at the same time.

Owl



The owl has two large eyes right in the front of the head. It can turn its head back and see the sights behind.

Cat



The pupil of the eye of a cat remains contracted in daylight and fully dilated at night. They have the ability to utilize even dim light. So they can see even in dim light.



Remember to collect the details of the vision of more living beings.

Knowing with closed eyes

Sit silently for a minute with eyes closed. Listen to the various sounds you hear.

Can you now hear sounds from a long distance? Can you hear the sounds of friends from other classes?



The ear helps us to hear. What are the different parts of the ear?

What we see is the pinna, the outer part of the ear. The role of pinna is to receive sounds and direct them into the ear. It is when these sounds pass through different parts of the ear and reach the brain that we recognise sound.

Look at the picture of the inner parts of the ear. Is pinna alone enough to detect sound?




Protection of the ear

Don't we see people inserting things carelessly into the ear? Won't such actions adversely affect the ear? What precautions should be taken to protect the ear?

- Do not put pointed objects into the ear.
- Do not listen to loud sounds continuously.
- Do not pour water or other liquids into the ear.
- Do not let the ear receive any blow.

People lose their hearing ability due to many reasons. The difficulties experienced by the deaf are beyond words. The devices they use are called hearing aids. There are mechanisms in them to enable hearing with clarity. Following are pictures of different types of hearing aids.



Though snakes do not possess external ears, they are able to make out even the slightest movements on the ground with the help of their internal ears. It means that though snakes cannot hear the sound transmitted through air, they can identify sounds transmitted through the ground.

Sensing by smell



How do people come to know when a ripe jackfruit is cut?

Which organ helps us in this?

It is the nose that helps us detect smell. Keep the following objects on a table.



Jasmine, curry leaves, cardamom, coconut oil, ginger, lemon, cumin seed, turmeric and camphor.

After blindfolding your friend, make her smell each of the above.

How many items could your friend recognise?

How many objects can you distinguish by smell? Write them down.

Don't we recognise stale food from their foul smell?

How do we come to know about a dead rat in our premises? Don't we recognise such instances of foul smell?

Can we distinguish a chalk, pen, pencil etc by smell?

Human beings generally have a weak sense of smell. Many creatures have a stronger sense of smell than humans.

Stalwarts of smell



Sharks are the stalwarts of smell. They can detect the smell of blood spilt at a far distance in the sea. The dog is another animal with a strong ability to identify things by smell.



You might have seen dogs urinating frequently on the way as they move. This is to trace the way back by smell. Dogs are used in the field of crime investigation due to their ability to smell and identify things.

Have you seen snakes frequently putting out their tongue? Do you know why? Snakes use the tongue to recognise smell.



The world of taste

Which is your favourite food?

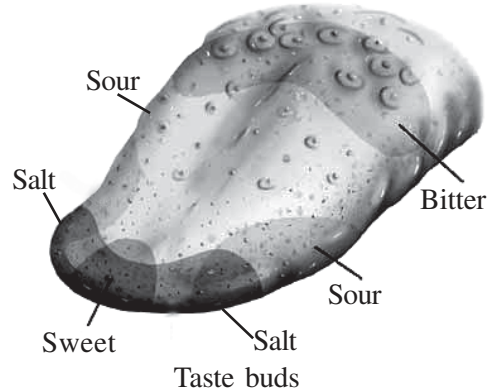
Why?

Isn't it the taste that makes us like food items?

It is the tongue that helps us detect taste.

Identifying taste

Food dissolves in saliva and stimulates the taste buds on the tongue. When this stimulation reaches the brain as impulses through nerves, we identify taste. It is with the help of taste buds that we identify salt, sour taste, sweetness, bitterness etc in the food.



With the help of the figure, identify where the different taste buds are seen on the tongue.

Which part of the tongue helps us identify sweet food?

Where on the tongue should you preferably place a tablet with a bitter taste?

Sensing by touch



Don't we feel when a small ant moves on our body? We also feel while drinking hot tea or when a thorn pierces our foot. How are these made possible?

We sense touch by means of the skin. The skin covers our entire body.

What all do we realise by means of touch?

- heat
- smoothness
- softness
- shape
- size
-

What all should be done to protect our skin?

- We should clean the skin very well while bathing
- We should protect the skin from excessive cold and heat

What if the skin did not have the sense of touch? We would never come to know about the wounds and injuries on the body!

Why do we examine objects by touching with fingers? The sense of touch is not the same in all parts of the body. Finger tips, cheeks and lips are more sensitive than other parts of the body.

We have learnt how information is given by various parts of the body. Observe the pictures and complete the table.



Situation in the figure	Information gained	Organ made use of
A child looking at the rainbow	Colours of the rainbow, shape of the rainbow	eyes

Sense organs

All living beings gather much information from the surroundings. This information is used to catch prey, to identify the mate, to escape from enemies, and to learn the changes around. For this, there are certain organs in all creatures. Human beings have five organs, namely eye, ear, nose, tongue and skin. These organs which give us information about the surroundings are the sense organs.

Sense organs – cleanliness and protection.

Haven't you understood the importance of sense organs?

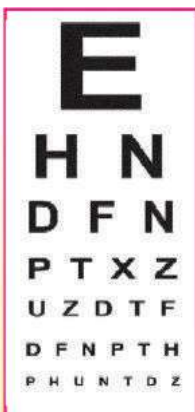
Shouldn't we protect each of them?

Which of the following ways do you agree with for the protection and health of sense organs? Mark with a tick (✓)

- Clean the body everyday by taking bath.
- Protect the skin from excessive heat and cold.
- Soap, cream and powder are required for the health of skin.
- Wash your eyes daily with cold water.
- Do not rub eyes with hand when dust or small creatures fall into it.
- Do not watch TV in a dark room.
- Do not put pointed objects into the ear.
- Do not listen to intense sounds continuously.

Do all children in your class have proper vision? Find out using Snellen's chart and with the help of your teachers.

Snellen's chart



In a Snellen's chart, letters, numerals or symbols are recorded in seven lines in different sizes. The primary testing of vision is done by checking the number of lines you can read properly from top to bottom. The chart is to be read from a distance of six metre. Using Snellen's chart in your school, examine your vision. Seek the help of an eye specialist if you cannot read all the lines clearly.



Significant learning outcomes

The learner can

- identify and explain that the sense organs give us vital information regarding surroundings.
- tabulate the functions of sense organs.
- realise the importance of cleanliness and protection of sense organs and practise the same in daily life.
- suggest measures for helping those who experience defects of vision and hearing. The learner can also develop an attitude to help them.



Let us assess

1. Establish the logic of the proverb “ Closed eyes open up ears”
2. “We don’t realise the value of eyes when we have them” - What are the ways to protect our precious eyes?
3. ‘Sense organs – windows of knowledge’. Substantiate.



Extended activities

1. Observe the living beings around you. Find out the animals that can turn ears in the direction of the sound.
2. Observe the changes in the eye of a cat during day and night.
3. From among your friends, find out those who have the highest efficiency of the eyes, nose and ears.
4. Collect data regarding the peculiarities of the sense organs of different creatures.

8

Keeping Diseases at Bay

Appu was busy with the final preparations to take part in the Subdistrict Science Fair. It was then that he fell ill. He took medicine but the fever did not subside. As directed by his doctor, when a blood test was done he came to know that he was suffering from dengue fever. Having reached the district level competition the previous year, it was his strong desire to participate at the state level this time.

Look at Appu's condition. What might be the circumstances that caused dengue fever? Have you ever been unable to carry out your pre-planned programmes due to diseases of this kind?



What could be the reason for the increase of such diseases during the rainy season?

Enlist the diseases you are aware of.

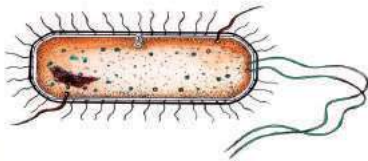
- stomach pain
- common cold
- head ache
-

Are all these diseases contagious?

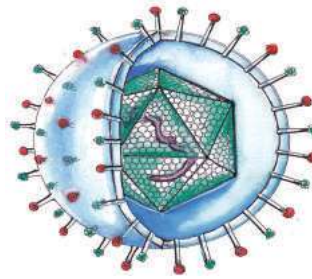
How are diseases transmitted?

Hope you have studied earlier that mosquitoes, housefly, rats etc. transmit diseases.

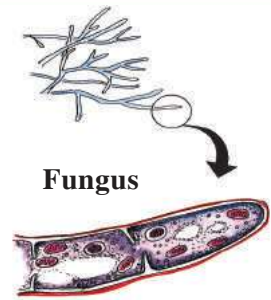
What causes diseases?



Bacteria



Virus



Fungus

Microorganisms

Diseases are caused by the action of microorganisms like virus, fungus and bacteria. Diseases spread when these microorganisms get transmitted from one infected person to another.

Carriers of diseases



How does the housefly transmit disease?

Common cold and jaundice are two different diseases. Do you think both are transmitted the same way?

Are different diseases like chikungunya, dengue fever, filariasis and diarrhoea spread by the same creature?

What are the ways by which the disease causing microorganisms get transmitted from one person to another?

- through water
- through food
- through air
- through creatures



Diseases transmitted from one person to another are called contagious diseases. Common cold, conjunctivitis, cholera, typhoid, chikungunya, dengue fever, filariasis, jaundice and rat fever (Leptospirosis) are some common contagious diseases in our place.

Mode of Transmission	Diseases transmitted
Through air	common cold, chicken pox, measles, tuberculosis
Through food and water	rat fever, typhoid, cholera, jaundice
Through housefly	cholera, diarrhoea
Through mosquito	filariasis, malaria, dengue fever, chikungunya
Through contact	conjunctivitis, leprosy

You have now understood that different diseases spread in different ways. Which of the above modes of transmission caused dengue fever in Appu? Wasn't it the bite of a tiny mosquito that shattered Appu's dreams?

If mosquitoes are kept away

What are the diseases that can be prevented by destroying mosquitoes? Where do the mosquitoes lay their eggs and multiply?

What are the favourable situations in your place for mosquitoes to lay eggs and multiply?

Aren't we responsible for creating favourable situations in our house and surroundings for the growth of mosquitoes?

Examine the picture and write down the situations favourable for the multiplication of mosquitoes.



- Uncovered air pipes of septic tank let in mosquitoes to the tank where they lay eggs and multiply.
- Surroundings are left unhygienic and uncleaned.
-
-

Hope you have understood the different situations in which mosquitoes multiply. What are the measures to be taken in and around your house to prevent this?

Record this in your science diary.

Do you think it is sufficient to prevent the multiplication of mosquitoes in the surroundings of your house alone?

Dry day observance

The eggs of mosquitoes take eight days to hatch. Haven't you studied that "Dry day" is observed once a week to prevent the breeding of mosquitoes? This is done by draining away stagnant water from coconut shells, toys, plastic pots, egg shells, pot holders and the terrace. It will be more effective when this is done on the same day by all the people residing in an area.



Pruning weeds and grass in house premises and cleaning the drainage are also methods to prevent the breeding of mosquitoes. Apart from these, we also employ certain techniques in our house to escape mosquito bite. What are they?

- Mosquito net
- Fogging
- Mosquito bat
-



Preventing transmission of diseases

We have discussed in detail the measures to prevent the transmission of diseases by mosquitoes. There are several other ways by which diseases are transmitted. How can we prevent them? Complete the table using hints from the picture.



Modes of transmission of diseases	Precautions to be taken
Through mosquito	<ul style="list-style-type: none"> • Avoid stagnation of dirty water • •
Through housefly	<ul style="list-style-type: none"> • Keep the house and premises clean • Keep food covered •
Through food and water	<ul style="list-style-type: none"> • Drink only boiled and cooled water • Avoid intake of stale food • •
Through contact	<ul style="list-style-type: none"> • Stay away from infected persons •
Through air	<ul style="list-style-type: none"> •

It is always better to adopt measures to prevent diseases than to go for treatment after getting infected.



Edubuntu School Resource see
'Pakarchavyadhikal' Video



Would there be infectious diseases if there were no microorganisms on earth?

If there are no microorganisms

Do the dead organisms remain as such forever in the soil?

Can you imagine what will happen if the dead bodies do not decompose?

It is due to the activity of bacteria and fungi that the organic remains decompose in the soil. This provides nutrients to plants and also

helps clearing the surface of the earth.

Let us examine in what other ways microorganisms are helpful.

- Turning milk into curd.
- Fermentation of rice batter.
- Converting atmospheric nitrogen into salts in the soil, which are easily absorbed by plants.
- Decomposing faecal matter into the soil.
- Used in the industries of milk products, vinegar, jute, tobacco, leather etc.
- Utilised in the field of medicine.



We learnt that microorganisms are useful in many ways. Aren't they harmful too? Organise a debate on this topic in your class.



Anand Mohan

Super bug



Super bugs are a kind of bacteria developed by a scientist of Indian origin, Anand Mohan Chakrabarty.

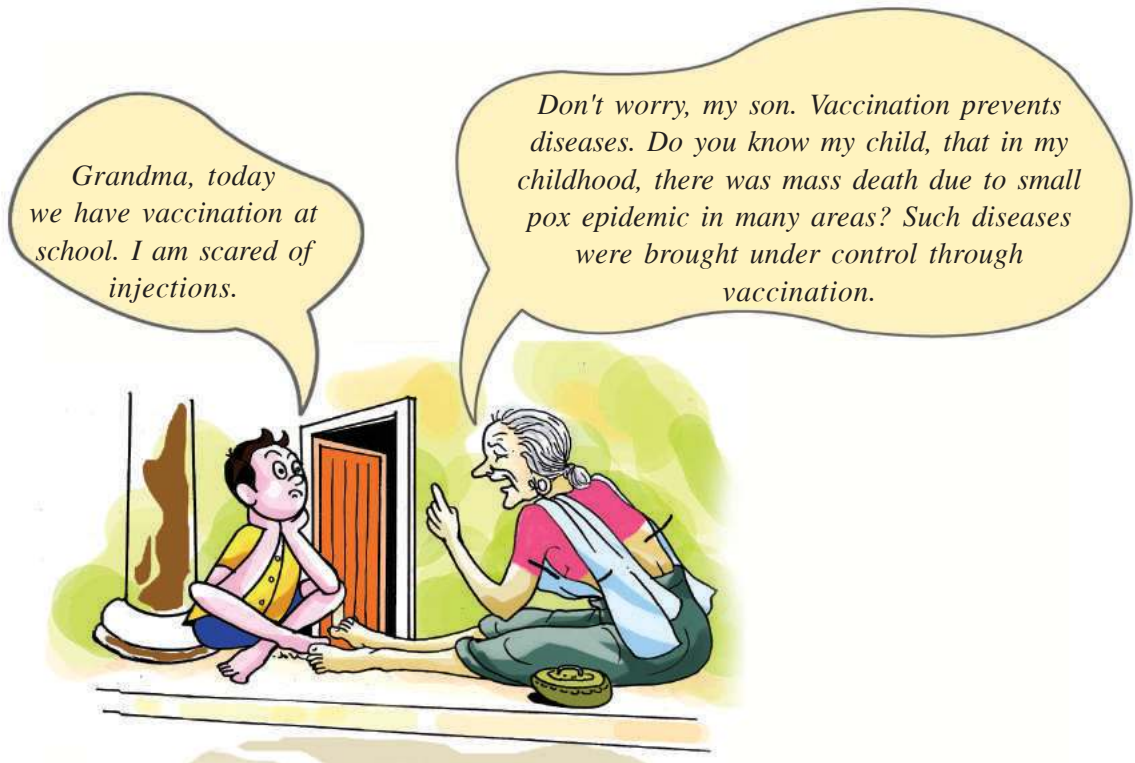
These bacteria feed on oil and so they are used to prevent the contamination of sea by the oil spilled from ships.

Harmful microorganisms cause diseases in us, don't they?

Can't we prevent them?

The human body has an innate ability to resist many diseases. This ability is not the same for all persons. That is why all the people residing in the same area are not affected by diseases in the same way. We fall ill when our body fails to resist the pathogen.

Artificial immunity



Are you also afraid of injections?

Why do we take vaccines? How does it protect us from diseases? Aren't you interested in learning about it?

Vaccination

Providing artificial immunity to the body against diseases is common nowadays. Vaccinations are used for this. The schedule of immunisation implemented by the Health Department to prevent many diseases, is available in hospitals. Refer to this schedule and record, after consulting your parents, the type of vaccination you have been given in time.

Don't your younger brothers and sisters also need protection from diseases through vaccination?

Is it the duty of your parents alone? Hope you also will take care of it along with them.

We have discussed Dry day observance and sanitation activities to be carried out in and around our houses for protecting our health. In addition, there are a few other things to be carried out individually to protect yourself from diseases. Listen to what they say.

Hygienic habits



Do you have more to add? Prepare a table of habits related to personal hygiene in your science diary.

Social hygiene

We are all careful about keeping personal hygiene. But, are we equally careful in the case of social hygiene?

Aren't there people in our locality who throw away domestic waste to the street?

Is it right to dump food waste and other garbage in public places and water bodies? Such actions that spread a lot of diseases are to be prevented.

Let us work together for a healthy society by ensuring social hygiene along with personal hygiene.



Significant learning outcomes

The learner can

- categorise and enlist diseases as contagious and non contagious.
- identify and explain the situations that cause diseases.
- realise that there are useful and harmful microorganisms and can cite examples.
- identify situations where diseases are spread through the housefly and mosquitoes and take preventive measures.
- recognise the importance of personal hygiene and social hygiene, give instructions and ensure cleanliness
- explain methods to prevent diseases.
- utilize the service provided by the Health Department for preventing diseases.



Let us assess

1. Which of the following statements do you agree to?
 - a. All microorganisms do not cause disease.
 - b. All diseases can be kept at bay by keeping personal hygiene

- c. By observing dry day once a week, we can prevent, to a certain extent, diseases caused by mosquitoes.
 - d. All vaccines are injected.
2. We have understood why there is an increase in diseases during the rainy season. What are the precautions to be taken before rainy season to avoid this?
 3. Do you think that medicines alone can prevent diseases? Substantiate your opinion.
 4. Prepare an essay on the topic, 'If microorganisms become extinct'.
 5. 'Prevention is better than cure' - Explain this idea in relation to vaccination, personal hygiene and social hygiene.



Extended activities

1. Prepare a notice to educate the public regarding the increase in diseases during the rainy season and the precautions to be taken to prevent this. Distribute it with the help of the Science Club in your school.
2. Carry out mosquito eradication activities in the surroundings of your school with the help of the Science club.
3. Conduct a survey in your place to find out to what extent the people are aware of different vaccinations.
4. Prepare beautiful wall posters on personal hygiene and display them in your school.
5. Design a new device or technique to control mosquitoes.





9

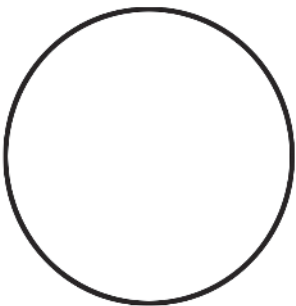
Space - A World of Wonders



Didn't you see the tiny ant sitting on the ball? Do you think the ant sees the ball the way you see it? How do you think the little ant, sitting on the ball, sees the shape of the ball? Try to draw it in the science diary.

Did your friends also draw the way you have drawn it?

Which of the figures given below matches the one you have drawn?



The ant sitting on the ball cannot see the ball as in the first figure. Since the ball is small, the ant would not see it flat as in the last figure either.

Why do you think the ant sees the spherical ball as in the second figure? Discuss.

Is your drawing correct?

Make necessary corrections in the science diary.

Would the ant see the ball in the same way if the ball were as big as your class room?

What if this ball grows to the size of your village?

to the size of your District.....?

to the size of our India.....?

to the size of the Earth.....?

As the ball grows in size it appears to be flatter and flatter for the ant.

We know that the earth is a large sphere. Have you seen the spherical shape of the earth? Aren't we too small like the ant when we are on this large sphere? Therefore it is not possible for us to see the spherical shape of the earth.

If so, what could be the way for us to see the actual spherical shape of the earth? Discuss.

Who might have got the first opportunity to see the spherical shape of the earth? Wouldn't it be the person who went very high above the earth? It was Yuri Gagarin. He saw this for the first time during his space travel.



The space

What sights do we see, when we look up from the earth? Let us tabulate.

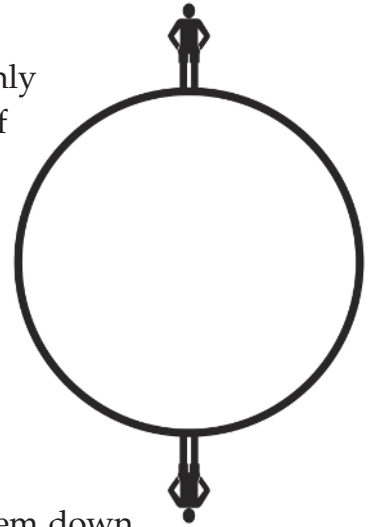


Birds, clouds, rainbow, aeroplane etc. are there in the earth's atmosphere. The atmosphere which rotates along with the earth is also a part of the earth. As we go further upwards, the atmosphere becomes thinner.

The vast empty region beyond the earth's atmosphere is the space.

Space around the earth

Do the atmosphere and the space beyond it exist only above us? Examine a globe. Isn't the position of America opposite to that of India on the earth? If so, aren't there atmosphere and space above the Americans too? Observe the picture.



Space exists around the earth. The earth is just one among several crores of celestial bodies present in the space. The moon is a celestial body in space and is the closest to the earth.

How many celestial bodies can you name? Write them down in the science diary.

- Earth •
- Moon •
- Sun •
- Mars •

There are many celestial bodies in our solar system and beyond it. It was the curiosity to know more about them that inspired humans to undertake space travel.

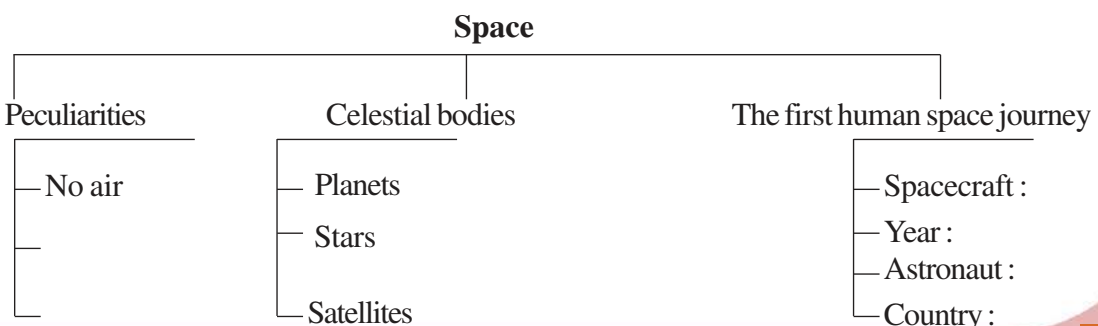
The first human space journey

Vostock – 1, the spacecraft of Soviet Union, took Yuri Gagarin, the first cosmonaut (Astronaut), to space on 12th April 1961.

We send not only humans, but also animals and many devices to space for scientific studies. Haven't you learnt certain things related to space? Add these in the science diary in a model of the concept map given below.



Yuri Gagarin



Artificial satellites

Artificial satellites are vehicles containing devices, and sent to space by human beings for different purposes. Today thousands of satellites of different countries revolve around the earth. What are their uses? Observe the depiction given below and write them down in the science diary.



Identifying Land resources (petroleum, minerals)



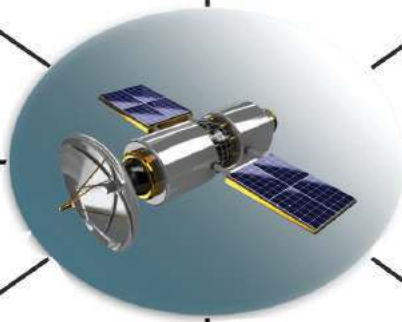
To identify fishery resources



Climatology



Communication (TV, radio, mobile phone, internet)



Study of forest lands and wetlands



Military, defense activities



Space research



To provide guidelines for land-sea-air transport



Sputnik - 1

Space Week



Sputnik – 1, launched on 4th October 1957 by the Soviet Union, is the first artificial satellite. The space age began with its launching. Internationally, October 4 to 10 is observed as ‘space week’. This week is observed to commemorate the launching of Sputnik-1 on 4th October 1957 and the

signing of the International Space Peace Agreement on 10th October 1959. ISRO, the space agency of India, conducts a wide range of competitions for school students every year in connection with ‘space week’.

Some important events in the history of space research are indicated below. Remember to watch the videos of such events with the help of your teacher.



Aryabhata (India's first artificial satellite - 1975)



The launching of America's first artificial satellite - 1958



Laika (The first creature from earth to reach space - Soviet Union - 1957)

Launching vehicles

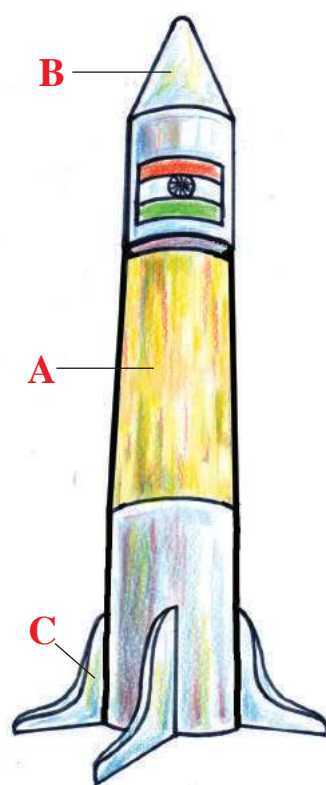
We need to send artificial satellites and humans to space for space study. Rockets are the launching vehicles used for these purposes. The small rockets we fire during Deepavali, Vishu, Bakrid and Christmas are the early forms of launching vehicles.



Saturn – 5
(The largest rocket ever made)

You have seen that a stone thrown up comes down. This is because the earth attracts the stone. The primary function of rockets is to take humans and satellites to space, overcoming the gravitational pull of the earth. Remember to watch different videos of rocket launching in the class with the help of your teacher.

Let us make a model of the rocket



Model of a rocket

Materials required:

- Thick pipes (an empty shuttle cock case, pipe made by rolling cardboard etc.)
- Chart Paper
- Gum
- Paint
- Thermocol

Method of construction

Prepare the part 'A' in the diagram using a moderately thick pipe. Prepare part 'B' with a folded chart paper or thick paper in the shape of a cone and fix on 'A'. Make part 'C', using pieces of thermocol. Now cut them in the shape as shown in the figure, paste them and paint it beautifully to make the model of a rocket. It would be good to paste the picture of India's flag at the top. Using more pipes, try to make models of different rockets.

Indian astronauts

Don't you know that the first Indian who conducted space journey is Rakesh Sharma? Besides him, people of Indian origin like Kalpana Chawla and Sunita Williams have also gone to space. During her second spaceflight, Kalpana Chawla was tragically killed in an accident that occurred to the space shuttle, Columbia. Sunita Williams holds two world records to her credit as, (i) the woman who has spent the longest time in space and (ii) the woman who walked for the longest time in space.



Rakesh Sharma



Kalpana Chowla



Sunita Williams

Space – a world of wonders

Listen to what Sunita Williams has to tell you about her experience in the space.

- *How beautiful is the sight of the earth through the window of the space station!*
- *We can see day and night on the earth simultaneously from here.*
- *The objects in the space station revolving the earth do not experience weight. Would you believe if I say that an ant and myself weigh the same here?*
- *We cannot walk here due to weightlessness. Walking here is a kind of floating.*
- *Even the air we need to breathe has to be brought from the earth.*
- *Here we drink water and eat food in a strange way.*
- *We cannot bathe here by pouring water. We scrub ourselves using a wet sponge.*
- *We cannot even sleep soundly here on bed. In order to prevent floating around, the body has to be fastened with a belt to the cot that is firmly fixed.*



Sunita Williams in the space station

- *As there is no air here, the sky appears dark. From here, stars can be seen even in day time.*
- *Haven't you understood that space is a world of wonders? Many experiences are yet to be shared. Enjoy with the help of your teacher the videos of the interesting experiences I have described.*

You have now learnt about the space experiences of Sunitha Williams. Write down the reasons for her experiences in the science diary.

Experiences	Reasons
Can see day and night on the earth simultaneously	As it is far away, the earth can be seen as a whole.
An ant or an astronaut does not experience weight	
Air for breathing has to be carried from the earth	
Cannot sleep well on a mattress	
Stars can be seen even in day time.	

Suppose you get an opportunity to meet Sunitha Williams. Would you like to ask her for more details?

Prepare a questionnaire with friends and write them down in the science diary.

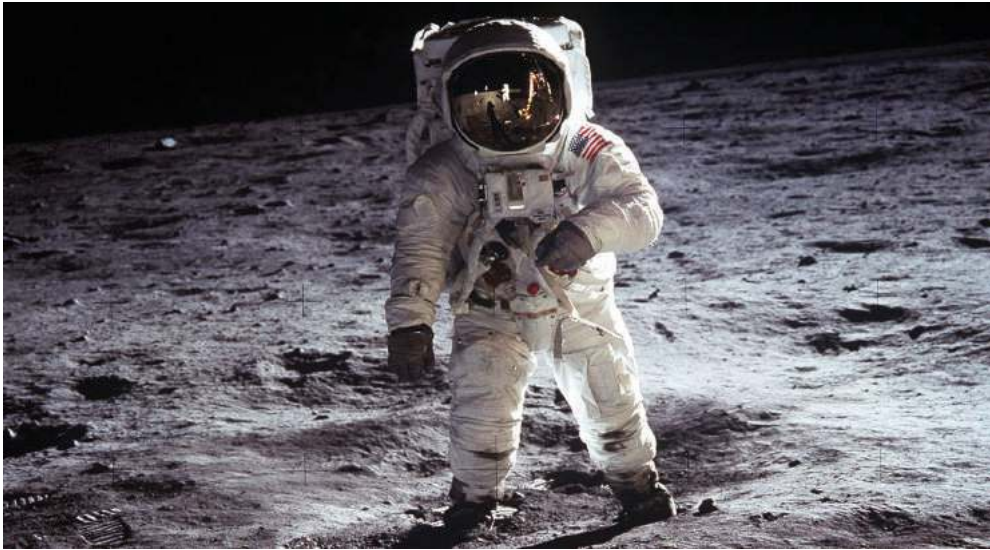
Human beings on the moon

The moon is the only other celestial body on which human beings have laid their foot on. The Americans, Neil Amstrong and Edwin Buz Aldrin were the first to land on the moon on 21st July 1969. The spacecraft Appolo II of the American Space Agency, NASA was used for this.



Neil Amstrong, Michel Collins, Edwin Buz Aldrin

The astronaut, Michel Collins also accompanied them, controlling the flight of the vehicle. July 21, the anniversary of the day humans first laid their foot on the moon is celebrated as the Moon Day.



Man on the moon

After the first journey to the moon, human beings have made five more journeys to the moon. Remember to watch the videos of journey to moon with the help of your teachers.

India in space



Vikram Sarabhai

India is also advancing very fast in the field of space research. Our space research agency, ISRO has been providing leadership in this regard.

Vikram Sarabhai, who initiated our space programmes, is known as the 'Father of Indian space programmes.'



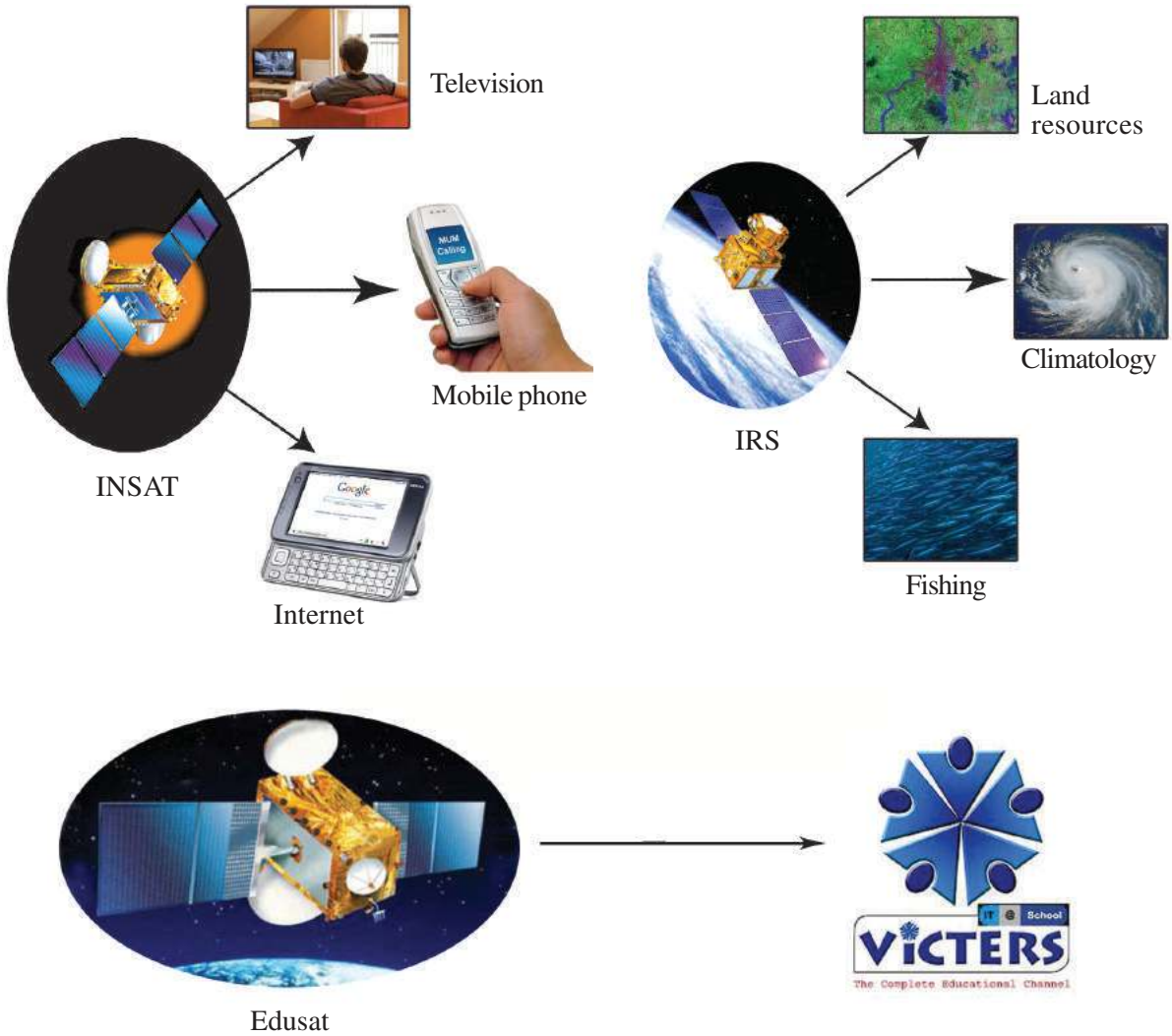
ISRO Logo

Space agencies of different countries



India	ISRO
USA	NASA
Europe	ESA
Japan	JAXA
Russia	RSA
China	CNSA

Initially, our satellites were launched with foreign help. However, today we have achieved wonderful progress in the field of satellite launching with the help of PSLV and GSLV rockets. We have launched many satellites for different purposes. Today we get many services from them. Observe the pictures given and tabulate their services in your science diary.



The satellites we depend on for communication are the INSAT series. IRS satellites are used for needs like study of earth resources, study of weather etc. Edusat is the satellite we use for educational purposes. We have launched many satellites for various purposes in the IRS and INSAT series.

Chandrayaan - the pride of India

Chandrayaan is India's moon exploration programme. Chandrayaan-1, India's first mission to moon was launched on 2nd October 2008. We can be proud that the very first Chandrayaan mission of India achieved remarkable success.

The presence of water on the moon was detected by Chandrayaan. Chandrayaan-2, Mangalyaan, the mission to Mars, Aditya- the solar mission etc. belong to the space programmes of India. Who knows tomorrow you may also be a part of India's future space programmes.



Chandrayaan

Seminar

Think of conducting a seminar in the class on the topic 'India in space'. What are the sub-topics that can be considered for this?

- India's artificial satellites and the services they provide.
- India's satellite launching vehicles.
- India's pride-Chandrayaan
- India's Mission to mars-Mangalyaan
- Future plans of India in the field of space research.
- Indians who contributed to the field of space research.

Prepare a space magazine including pictures, news, notes etc. of artificial satellites, spacecrafts and astronauts.





Significant learning outcomes

The learner can

- explain what space is
- identify and explain the landmark events in the history of space exploration.
- give examples by identifying the services of artificial satellites.
- make models of satellite launching vehicles.
- explain details of Indian astronauts.
- explain the difficulties and wonders experienced by astronauts during their sojourn in space and also give reasons for them.
- explain the details of human journeys to the moon.
- explain the satellites, launching vehicles and space exploration programmes of India.



Let us assess

1. Did you utilise any service of artificial satellites yesterday and today? Explain.
2. How does the living conditions of an astronaut in a space station differ from your living conditions at home?
3. "Artificial Satellites provide us with many facilities of life we enjoy today." Do you agree with this statement? Discuss.
4. India is a great power in the field of space today. Evaluate.



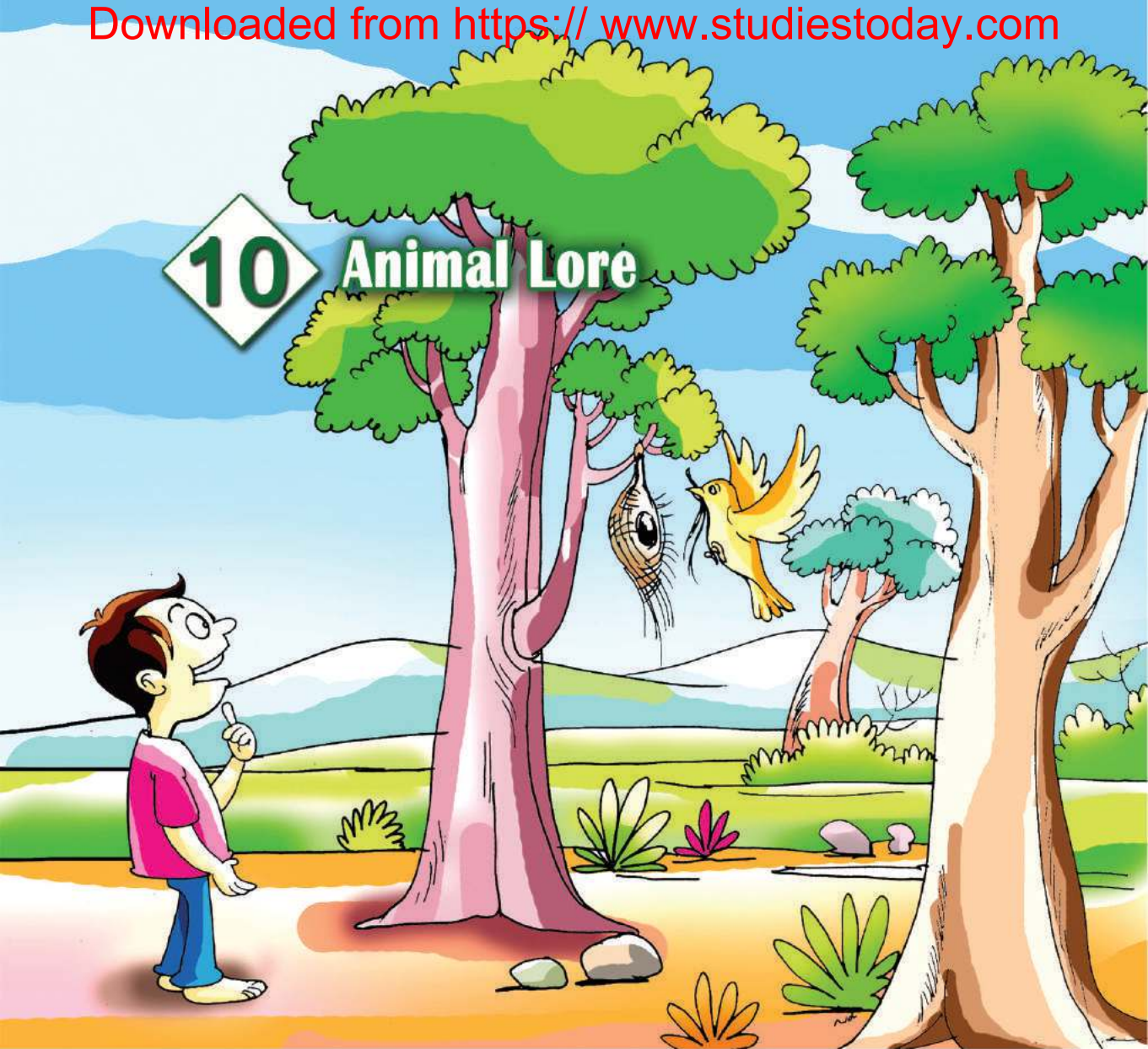
Extended activities

1. Prepare questions group-wise and conduct a quiz competition on space in your class.
2. Read the biography of any astronaut. Write down in the science diary the part you like the most.
3. Observe the sky on a clear night. You can see some dots of light moving from south to north, in the sky. These are artificial satellites. How many artificial satellites are you able to observe a day?



10

Animal Lore



Rahim was playing in the courtyard. He saw a sparrow picking up something with its beak and flying to a guava tree. When he observed the bird doing it repeatedly, he understood that it had been collecting fibre.

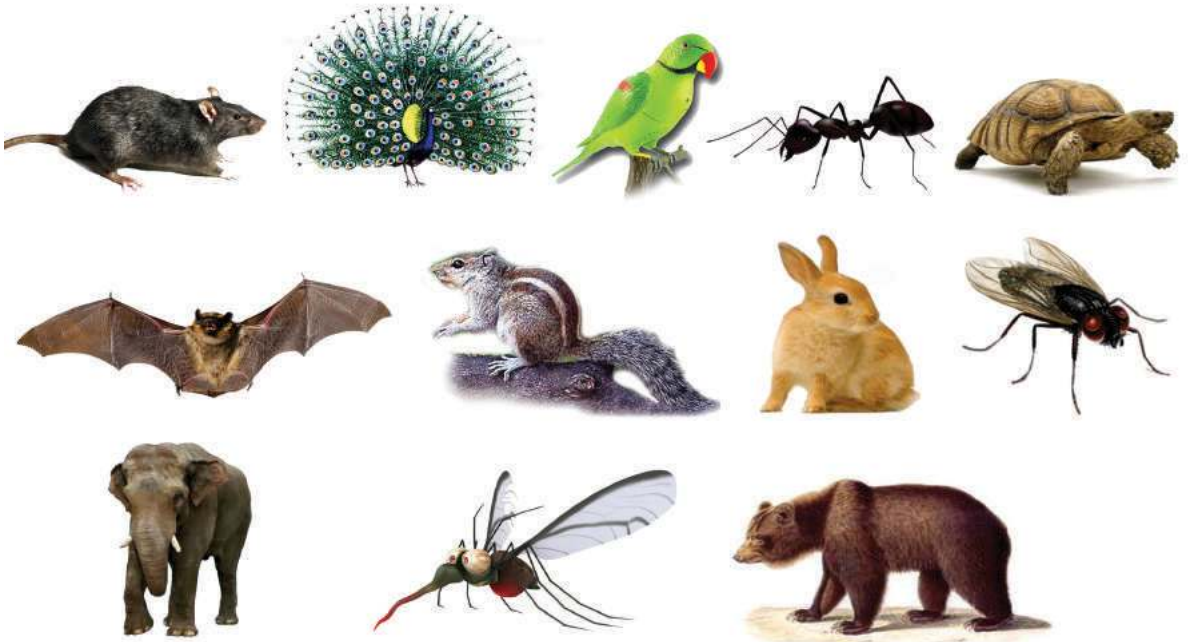
“Why does the bird carry fibre, mother?”

“The bird is building a nest to lay eggs. Don’t disturb. Let us watch it with a binocular till it completes the nest and hatches the eggs”.

“But Kurinji, the cat had its kittens not by hatching eggs!” Rahim expressed his doubt.

“All creatures do not lay eggs. The cat and the dog give birth to their young ones”.

Look at the pictures. Identify and write down the names of those that lay eggs.



Expand the table with the names of more creatures that lay eggs.

Do all birds lay eggs? Heat is essential for the hatching of eggs. That is why most of the birds incubate.

But what about the cuckoo?

The cuckoo lays eggs in the crow's nest!

The eggs of ducks are hatched either artificially or by making a hen incubate those.

The period of incubation is different for various kinds of birds.



Birds	Incubation period
Hen	21 days
Pigeon	14 days
Sparrow	14 days
Ostrich	42 days
Love birds	22 to 25 days





Observation opens up before you many interesting facts about the world of birds. What are the things to be observed?

- colour, size, shape
- food and mode of procuring food
- Peculiarities of beaks and legs
- peculiarity of feathers
- mode of flight
- sound
- nests
- place where they are seen.

Observe the birds we normally see everyday like the pigeon, crow, myna, crow pheasant (*uppan*), parrot, stork etc. and note down your observations in the science diary.



Paradise Flycatcher



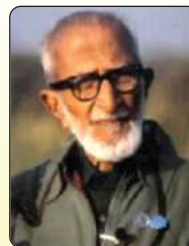
Common teal

Some varieties of the common teal (*eranda*), eastern golden plover (*manalkkozhi*) and paradise flycatcher (*nagamohan*) visit our place as guests. These are migratory birds that come from other countries to our place looking for favourable life situations. Kadalundi, Thattekad and Kumarakam are places in Kerala visited by many migratory birds. With the assistance of the Forest Department, camps are organised for students in such places. Try to make the best of these opportunities with the help of your teacher.

How is bird-watching done?

The suitable time for bird-watching is early morning and evening. It must be done from a distant place without making any sound. Binoculars may be used for this. Bird-watching can also be done by attracting birds to yards, keeping food and water in coconut shells hung from trees.

Dr. Salim Ali



Dr. Salim Ali was a world famous bird watcher. November 12, his birthday, is observed as National Bird Watching Day. *Birds of India*, *Birds of Kerala* etc. are his books on bird watching. *The Fall of a Sparrow* is his autobiography.



The world of oviparous (egg laying) organisms

You know that birds reproduce by laying eggs. Do birds alone lay eggs? Have a look at the classification of organisms that reproduce by laying eggs.

Group - 1	Group - 2	Group - 3
Ant Grasshopper Moths Beetle Housefly	Sardine Mackeral Snake head fish (<i>varaal</i>) Cat fish (<i>mushi</i>) Rainbow fish (<i>gappi</i>)	Crocodile Snake Lizard Mabuya (<i>arana</i>) Calotes

Do you find any common features in each group?

Insects are included in the first group. What about the other groups?

Observe the pictures given below. These organisms which can live both on land and in water also lay eggs.



Frog



Caecilian



Salamander



Story of the Salmon Fish

Salmon is a kind of fish which travels long distances to lay eggs. In summer, they start their journey from the Pacific Ocean. This journey ends two thousand and five hundred kilometres away in the North American rivers. Waterfalls and violent water currents in rivers are never a hindrance to their journey. Overcoming all hindrances, they reach the origin of the rivers, lay eggs and die on the sandbanks. The hatched young ones then return to the ocean.



Organisms in Group 1 with which you are familiar are insects. Group 2 are pisces. Organisms included in Group 3 are reptiles. Their skin is dry and scaly. Organisms like frog, salamander and caecilian can live both on land and in water. They are called amphibians. Try to list the organisms that are oviparous.

1. Birds
2.
3.
4.

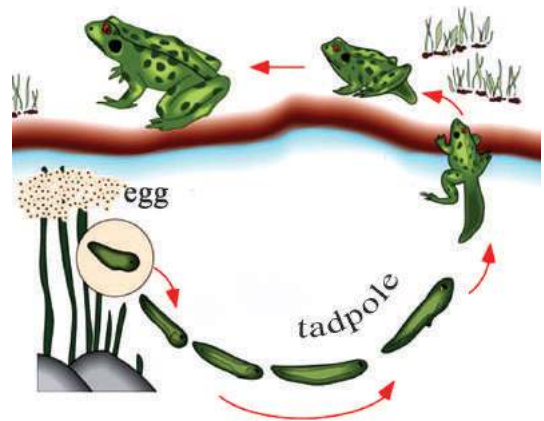
Find more examples for each group and write them down in your science diary.

You have noticed that the young ones hatching out of a hen's eggs resemble their parents.

But do the young ones that hatch out of frog's eggs look like the parent frog?

Observe the picture.

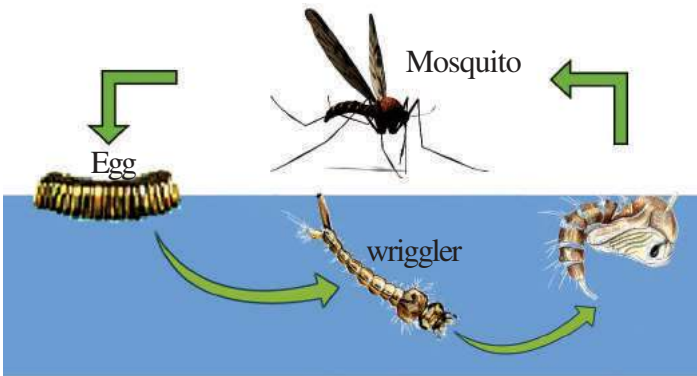
Write the notes of your observation in the science diary.



Metamorphosis of a frog

Metamorphosis

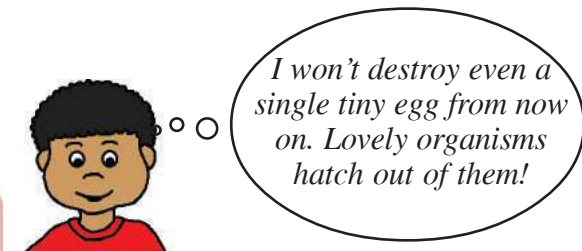
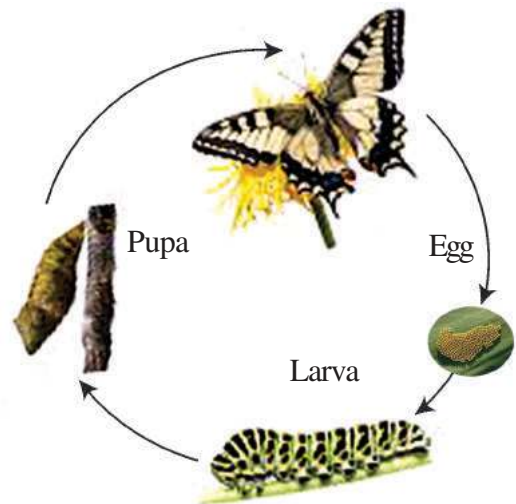
The young ones hatching out of the eggs of certain organisms do not resemble their parents. They are called larvae. Metamorphosis is the process by which young ones in the larva stage develop into organisms similar to their parents through different stages of growth.



Metamorphosis of mosquito

The young one hatching out from the egg of a butterfly resembles a little worm. In the metamorphosis of a butterfly, the adult butterfly is formed after the larva and pupa stages. Metamorphosis occurs in insects like honey bee, butterfly, dragonfly, mosquito, housefly etc.

Do you know that the doodle bug is the larva of a variety of dragonfly? Metamorphosis is seen mostly among insects.



Look at the different kinds of butterflies and their larvae in the pictures. Most of the leaf-eating worms that we destroy are young ones of some butterflies. We destroy many of them without realizing it. Knowingly or unknowingly, this leads to the extinction of certain varieties of butterflies. Under the auspices of the Nature Club, make a butterfly park in your school to protect them.

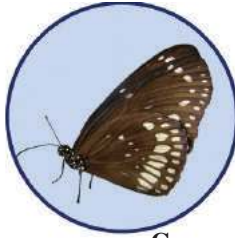


Butterfly park

The Little Yellow Butterfly, Common Mormon, Southern Birdwing Butterfly, Blue Mormon Butterfly etc. are butterflies commonly seen in our locality.

Each butterfly lays eggs on particular plants. We can attract butterflies to lay eggs by growing these plants. Calotropis (*erukku*), Curry leaf plant, Citrus plant etc. are examples of such plants. Try to plant them along with the flowering plants at your school.

Butterflies and their larvae



Common Indian Crow
(*Aralisalabhum*)



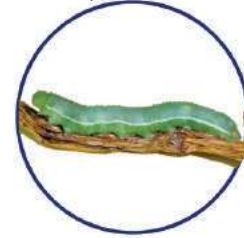
Southern Birdwing Butterfly
(*Garuda Salabhum*)



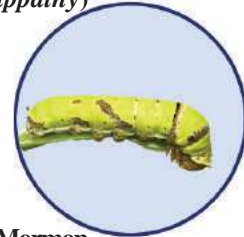
Blue Mormon Butterfly
(*Krishna Salabhum*)



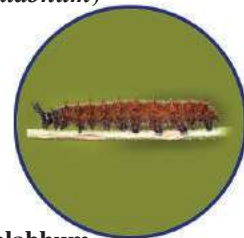
Little Yellow Butterfly
(*Manjapappathy*)



Common Mormon
(*Naraka Salabhum*)



Okila Salabhum



Many butterflies will visit this park. Many varieties of butterflies are now facing the threat of extinction. Like the butterfly, the sea turtle is another organism which faces the threat of extinction.

Sea turtles

The sea turtle comes from the sea to the shore and digs sand to lay eggs. These eggs are often destroyed in large numbers due to the interference of human beings, leading to the extinction of sea turtles. Many voluntary organisations in Kerala work towards their protection. Sea turtles are protected by the Forest department in Muthiyam seashore of Vallikkunnu in Malappuram district.



Those that give birth and feed milk (Viviparous organisms)

Organisms like the cat, rabbit, cow, goat etc. give birth to their young ones and feed milk.

Mammals

Mammals are creatures which give birth to young ones and feed milk.

Let us find out the peculiarities of mammals.





- Give birth to young ones and feed milk.
- Hair on the body.
- Presence of pinna.

Observe the creatures you know and prepare a table of mammals. Try to find out whether these creatures possess the above features.

Flying mammal

The bat is a flying mammal. Webbed forelimbs help them to fly. Though bats resemble birds, they give birth to their young ones and feed them with milk.

Oviparous creatures among mammals



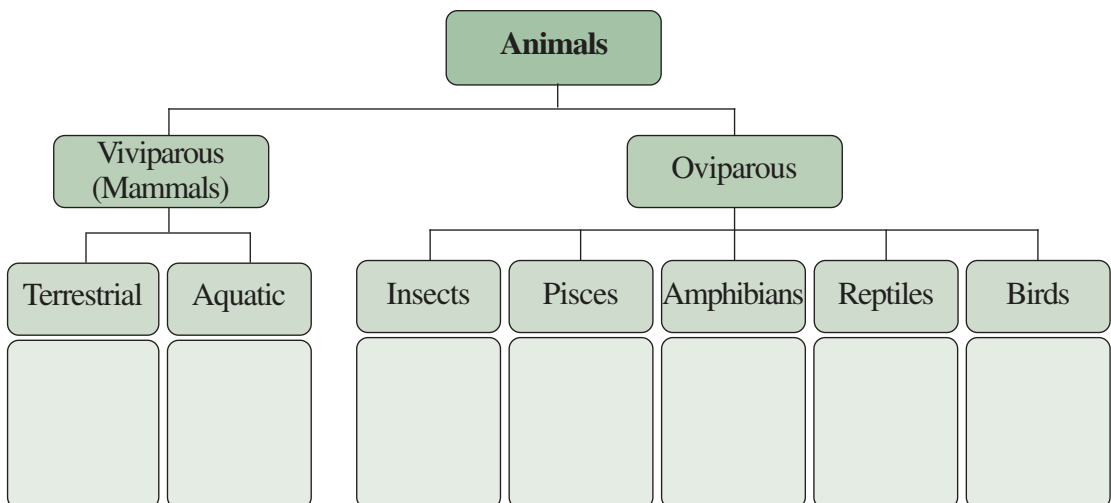
Platypus



Echidna

Though mammals generally give birth to their young ones, there are also certain egg laying ones among them. Platypus and Echidna are egg laying mammals. They feed their young ones with milk.

We have so far discussed how creatures reproduce by giving birth or laying eggs. Based on this, complete the illustration given below in your science diary.





The living world is a storehouse of wonders. Have a look at a few more wonders of the animal world.

New creature from body parts



Planaria

If the body parts of organisms like earthworm, planaria (a kind of flat worm) etc. get cut, the severed parts grow into new organisms.

Father giving birth!

Sea horses belonging to the group of fish are creatures seven inches long. Eggs laid by female sea horses are stored in a sac seen in the abdomen of male sea horses. After 40 days, these eggs hatch and young ones come out of the sac. That is why the male sea horse seems to give birth to its young ones.



Sea horse

Marsupial

The Kangaroo, commonly known as marsupial (pouched mammal), is found in Australia. They look after their young ones keeping them in a sac in their body.



Viviparous snake

The eggs of viper hatch within the body itself. When the young ones come out of the body, it appears that the viper gives birth to its young ones. After the young ones have come out, the viper does not take care of them.



Corals

The Corals described as rain forests of the sea are living organisms that appear like a garden at the bottom of the sea. They are also the habitat of different kinds of sea-creatures. Corals that control sea turbulence to some extent and are used for making medicines for



various diseases, are now facing the threat of extinction. The years 1997 and 2008 were observed as "Coral years" in order to create awareness of the importance of protecting them. The world's biggest coral reef is the Great Barrier Reef in Australia. There are corals in abundance in Lakshadweep also.

Try to collect more information about corals. Many human activities adversely affect organisms. When trees are cut down, many animals which depend on trees get destroyed. Can you list some more human activities which lead to the destruction of biodiversity?

- Deforestation
- Levelling paddy fields and water bodies with mud
- Catching fish by mixing poison in water
-

Try to conduct a seminar in your class on how human activities affect biodiversity. Won't you prepare a biodiversity register of the animals found in your place?



Significant learning outcomes

The learner can

- classify animals based on their mode of reproduction.
- classify oviparous organisms into insects, pisces, amphibians, reptiles, birds etc.
- explain the concept of metamorphosis with examples
- identify and explain the common features of mammals.
- intervene carefully in nature and engage in environment protection activities with the awareness that all organisms are to be protected.



Let us assess

Choose the correct one

- While classifying animals, Satheesh placed the cow, cat, elephant, bat and whale in one group. What could be the peculiarity on which this grouping is based?
 - All are terrestrial
 - Have four legs
 - Give birth to young ones
 - Have external ear.
- The young ones hatching out of eggs are not similar to their parent. This description is suitable for which of the following creatures?
 - Dragon Fly
 - Sparrow
 - Snake
 - Lizard
- Hope you understand the peculiarities of different groups of organisms.

Complete this table. Analyse the table and write down the inferences.

Group of organism	Nature of skin	Mode of locomotion	Pinna	Lay eggs/give birth to young ones
Pisces	skin with hard scales	swim	No	Lay egg
Amphibians				
Reptiles				
Birds				
Mammals				

- “I am afraid of worms. But I like butterflies very much”. What is your response to Raju’s statement?



Extended activities

1. Visit a pond in your area. Observe the organisms you find there and list them. If this pond is levelled, how will it affect the existence of living beings?
2. Collect information about great bird watchers.
3. Prepare an album of organisms, classified on the basis of the criteria learnt in this chapter.
4. Visit nearby bird sanctuaries, butterfly park etc.
5. Observe and write the names of the different types of butterflies that visit the plants in your home yard. Which flowers are visited by more number of butterflies? Consolidate the information after observing for 10 days.

