

VASUDHAIVA KUTUMBAKAM - V

We, Our World

ENVIRONMENTAL STUDIES

PART 2



NAME _____

SCHOOL _____

Vasudhaiva Kutumbakam

– We, Our World



EVS – TERM 2

‘Vasudhaiva Kutumbakam – We, Our World’

Second Edition published in 2024

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Preface

पृथिव्यापस्तेजो वायुराकाशमिति भूतानि (Nyaya Darshanam,1.1.13)

Vedic knowledge states that everything in this universe, including our body, is made of five basic elements, also known as the Pancha bhoothas - Prithvi (Earth), Aapa (Water), Teja (Fire / Energy), Vayu (Air) & Aakasha (Space). We therefore need to understand the environment around us in our eternal journey of self-discovery.

Numerous teachers with their rich and vast experience have compiled the existing knowledge on above aspects, in this series, “Vasudhaiva Kutumbakam- We, Our World” to help the students understand the world holistically. The content has been carefully curated, so that it reflects the rich cultural diversity of our motherland Bharat enabling the student to intuitively understand the unifying values that bond the citizens of this great land together. The book, thus, will help children gain skills required for the 21st century and be a universal citizen with a passion for following the Indian values.

The text book has been written in such a way that it builds curiosity, a spirit of experimentation and discovery. Formal descriptions and definitions have been kept to the minimum. The lessons proceed as conversations & stories to sensitise children to aspects of communication and build empathy. Also, assessment modules have been consciously kept to the minimum to encourage teachers to frame questions that suits the perspective of the students. It is also suggested that the evaluation be continuous and comprehensive. Children should be credited not only for the answers that they give to the questions asked, but also for the thoughtful questions that they raise in the class room in the context of the lesson, and the activities that they engage themselves in, to apply their learning.

There is no copyright on the content of this book. One can seek permission and print all or only certain chapters of the book. However, no unauthorized modification is permitted in any chapter. Considering the social orientation of the organisation, we have consciously kept the cost affordable without compromising on quality of paper/ print. Also, the e-copy of the entire book will also be downloadable for free from our website, davchennai.org/publications/



This edition of the book could have not only omissions, but also areas of improvement. We request the reader to excuse us for the omissions, but please do bring to our notice any feedback for correction and improvement in subsequent editions. We will remain grateful to you for your support and feedback.

Lastly before signing off, we would like to express our profound gratitude to the Almighty for the guidance and encouragement in this endeavor. As it is rightly said, “We do not inherit the Earth from our ancestors, we borrow it from our children”. Hence let us teach our children to be grateful for all that we have, empathise with God’s creations and accept the responsibility of preserving it well for the future generations.

माता भूमिः पुत्रोऽहं पृथिव्याः ।

“Earth is my mother and I am her child”. (Atharva Veda 12.1.12)

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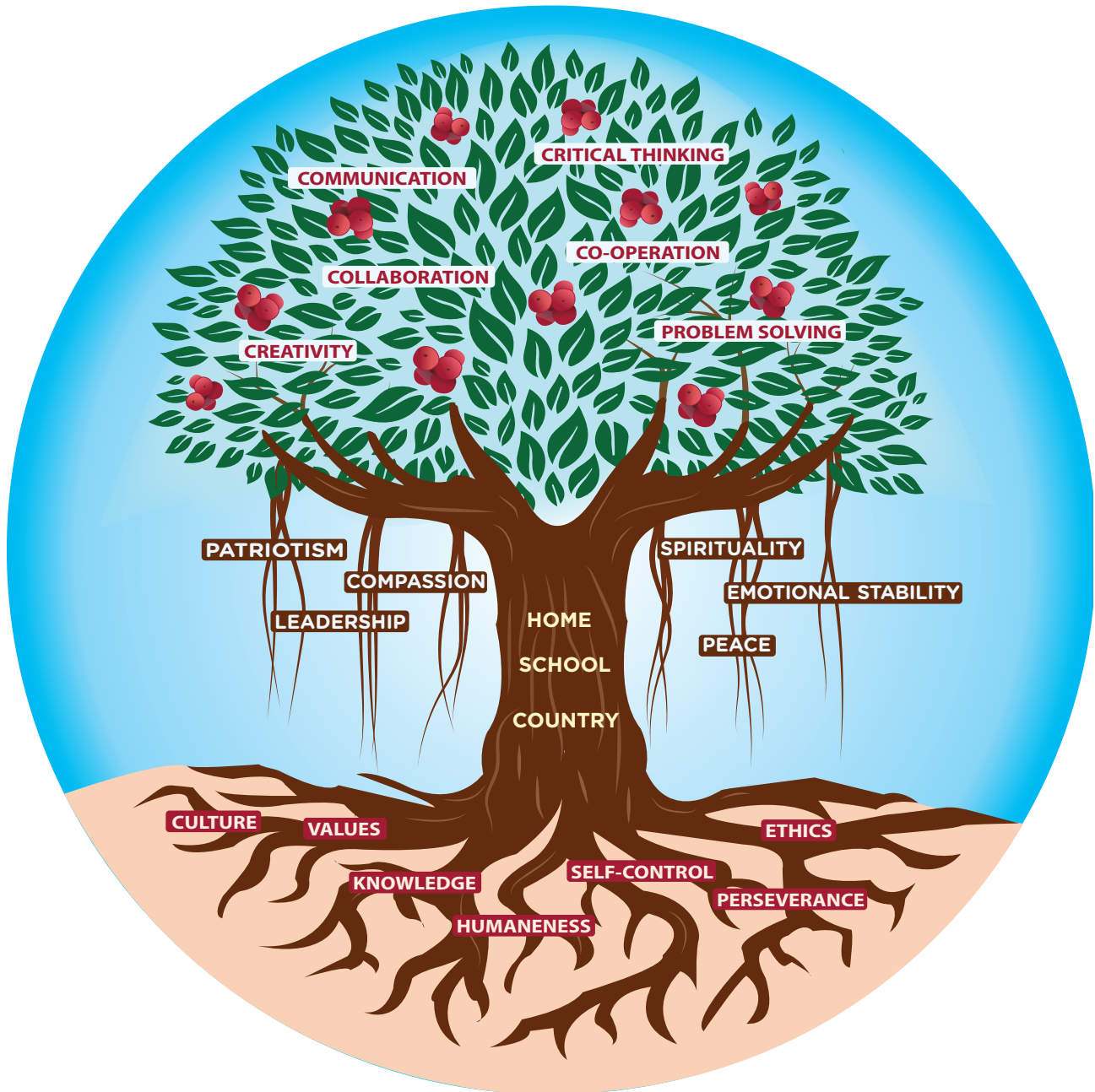
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The Learning Tree

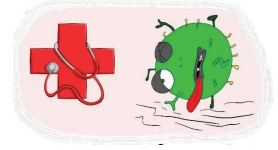


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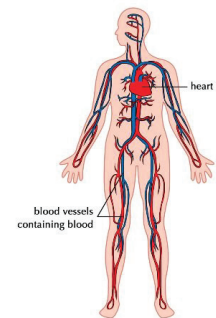
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SIMPLE MACHINES



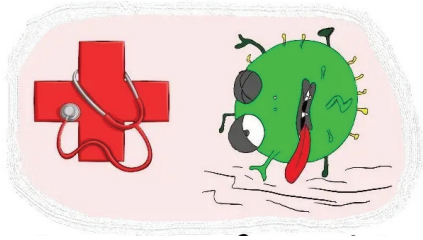
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Prevention is better than cure

8



Expected Learning Outcomes

Students...

know the definition of health, the different types of pathogens, the diseases caused by various pathogens, the uses of antibiotics, the ways to maintain personal hygiene

know the meaning of pathogen, vector, immunity, infectious diseases, acute and chronic diseases, genetic disorders, mental and social well being

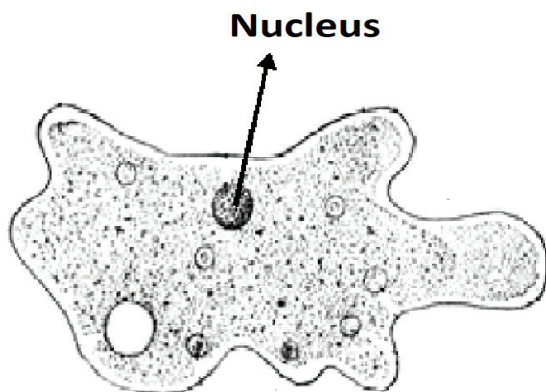
know how virus behaves in and out of a living being

understand how communicable diseases spread, penicillin and small pox vaccine were discovered, **the meaning of** malnutrition and over nutrition

understand the importance of keeping food covered, keeping surroundings clean, vaccinating pet dogs and cats against rabies, anti-rabies vaccine in the event of a bite by a dog or a cat, a balanced diet and healthy lifestyle, vaccines in preventing diseases



KEEP THE PATHOGENS AWAY



Amoeba

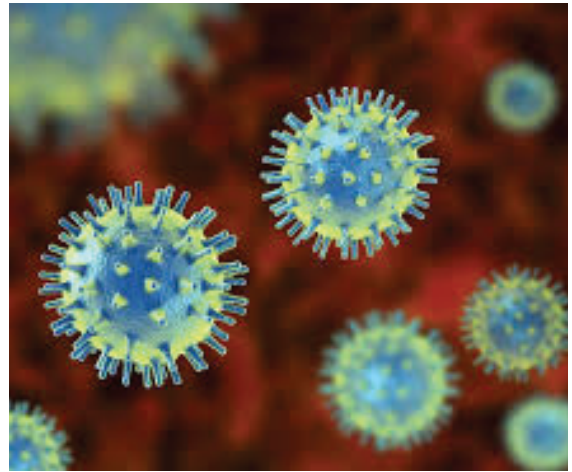


Bacteria





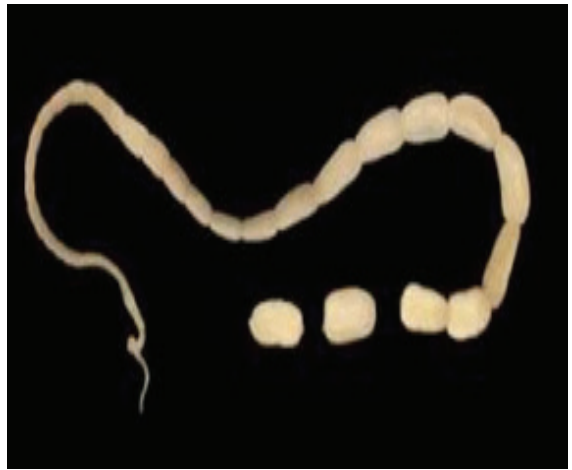
Fungi



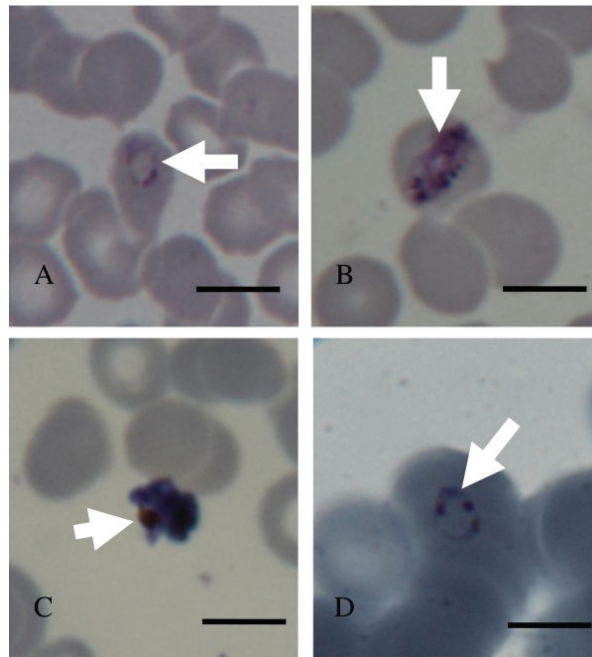
Virus



Pathogen causing Filariasis



Tapeworm



Protozoan causing Malaria



It was EVS period for Class V. The acharya enters the class with a bunch of papers.

Students: Namaste acharya.

Acharya: Namaste children. Please be seated.

Vinod: Acharya, are they question papers? I have not prepared for any test today.

Acharya: Don't worry. They are not question papers. Instead they have answers to a lot of questions that you may have on your mind. This is an assignment, where you need not answer questions, but prepare questions to ask each other.

Vikram: That sounds interesting. How do we go about it acharya?

Acharya: I have prepared an article on 'Health and Diseases.' I have a copy of it for all of you. I shall give you all two days time to read it and come prepared for a class room discussion.

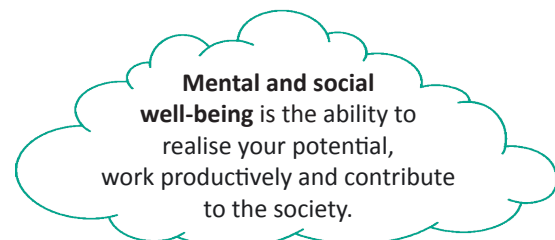
All children receive a copy of the article, keep it in their bag safely.

Vikram goes home and decides to read it right away as he is always interested in knowing about how his body works and how he can remain healthy. He reads the material, makes notes to elaborate on a few points and writes down a few questions and thoughts that he would like to have better clarity on.

Let us start reading the article along with Vikram and make notes to discuss in the class. A few bubbles are left blank for your note making.

The World Health Organization (WHO) defines health as a state of complete physical, mental and social well-being, not merely the absence of disease. So, it is understandable that mental and social well-being are an integral part of one's good health.

Diseases could be caused due to pathogens or improper life style. Some diseases could also be hereditary.



Infectious diseases/ Communicable diseases

Infectious diseases are caused by Pathogens and can be transmitted from one person to another.



The pathogen that causes the disease can be either a bacteria, virus, fungi, protozoa or a worm.

Diseases caused by bacteria

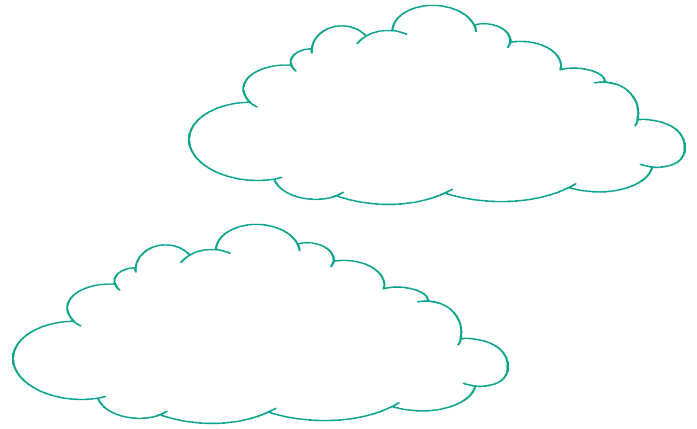
Diseases like tuberculosis, typhoid, cholera, dysentery are caused by bacteria.



S.No.	Name of the disease	Organism causing it	Spreads through	Symptoms	Measures for prevention
1.	Tuberculosis	Tuberculi bacteria	Air	Low grade fever, persistent cough, loss of appetite, weight loss	Vaccination at the time of birth (to a large extent). Covering the nose and mouth while coughing and sneezing. The infected person avoiding crowded places
2.	Typhoid	Typhi bacteria	Contaminated food and water	Fever, headache, stomach ache, loose stools, nausea	Keeping the food and water covered. Drinking boiled water. Avoiding food from roadside and unhygienic places
3.	Cholera	Vibrio cholerae bacteria	Contaminated food and water	Sudden onset of rice watery stools, fever	Inoculation (when there is an outbreak in an area), keeping food and water covered, avoiding food from unhygienic places
4	Dysentery	Shigella bacteria, some other organisms like amoeba can also cause the same symptoms	Contaminated food and water	Stomach cramps, loose stools, nausea, vomiting, fever	Keeping the food and water covered. Drinking boiled water. Avoiding food from roadside and unhygienic places



When a disease is spread by contaminated food and water, it can to a large extent be prevented by keeping the food and water covered to prevent flies that carry these pathogens from contaminating them. Flies tend to hover around fecal matter, which has organisms that causes disease. These stick on to the body of the flies. When these flies sit on food, it gets contaminated. When we eat the contaminated food, the organism enters our body, causing the disease. Thus, insects like flies are carriers of diseases.



It is very important to keep our environment clean so that such organisms do not breed. It is also important to have proper restrooms and not urinate or defecate in the open to prevent spread of diseases.


When we do not wash our hands with soap and water after using the restroom, the pathogens can remain on our fingers and can cause diseases.

It is also very important to keep our nails short, so that the organisms do not get lodged between our nail and the finger. This prevents the organism from entering our body, during intake of food.

Tuberculosis is a disease caused by bacteria that commonly affects our lungs. It can sometimes affect the other parts of our body also. When the infected person does not cover his/her nose and mouth while coughing and sneezing, the droplets containing the disease-causing organism gets into the air around. When we breathe in such air, we contract the disease.

How do we treat bacterial infections?

Diseases caused by bacteria, are treated using medicines called antibiotics, which are effective only against bacteria and not against any other pathogen.



Ponder

What are antibiotics?



Enrichment

How was penicillin discovered?



Alexander Fleming had been working to find a way by which the growth of the disease-causing bacteria can be curtailed. One day in 1928, when he entered the lab, he was upset that the bacterial colony that he had grown (bacterial culture) was contaminated by a mould, *Penicillium notatum*. But on close observation, he found that the mould had in fact, stopped the growth of the bacteria. This observation led to the discovery of penicillin, the antibiotic that saved the lives of many during the World War II.



Diseases caused by virus

Viruses are a group of organisms that are neither living nor non-living. When a virus is outside of a living body, it behaves like a non-living thing. Once, it enters a living being, it multiplies in number like a living organism.

Common diseases caused by viruses are common cold, measles, mumps, chicken pox and COVID-19.

The common symptoms for a viral infection are high fever, body ache, head ache and fatigue.

Measles and chicken pox are viral infections which give out a rash or small boil like eruptions on our body.



Ponder

Why is there no vaccination against common cold?



Chicken pox

Many of the viral infections get resolved when we rest adequately, have plenty of fluids and take medications to reduce fever and body ache.

Diseases mentioned above spread through air and by bodily contact with the patient. So, the best way to prevent the spread of these diseases is to isolate the patient for about 7 days, as it takes five to seven days for the virus to lose its virility. We have vaccines that can prevent measles, mumps, chicken pox and COVID-19. Vaccinations prevent these diseases to a very large extent. The chances of us getting a severe disease is less, even if we contract it after vaccination.

Polio is a disease caused by polio virus. It enters our body when we consume contaminated food and water, through the digestive system. However, it affects the nervous system. A person affected by polio becomes disabled and is not able to use his hands/legs/or both depending on which part of the spinal cord is affected.



Think about...

Why do we see polio crippled people though polio has been eradicated?

This crippling disease has been curtailed to a very large extent by vaccination drives.

There are no reported polio cases in India since 1977. India was declared polio free from 1980. However, to prevent the disease from entering our country from other nations, we continue to administer polio vaccines to children according to the schedule advised by Indian Council of Medical Research (ICMR).



Small pox was the first viral disease to be eliminated from the Earth by universal vaccination. Small pox was rampant in early 19th and 20th centuries, killing many and crippling many more for life.

Some viral infections like rabies spread by bite of animals. Bite of a warm-blooded animal that is infected with rabies virus can infect human beings. The disease is best prevented, as getting infected can be fatal. Hence, it is important to vaccinate pet dogs and cats against rabies, so that we do not contract it from an infected animal.

If bitten by a stray dog or cat, we need to take the prescribed course of anti-rabies vaccines at the government authorized centres to protect ourselves from rabies. It is important to take the first dose of the vaccine within 24 hours of exposure to the virus.



Enrichment

In 1796, an English doctor Edward Jenner noticed that milkmaids who got cowpox were protected from small pox. He guessed that exposure to cowpox could be the reason for protection against small pox. He exposed the milkmaids affected with cowpox to the pathogen causing smallpox and observed that his thought process was correct. Thus, humanity got the vaccination for small pox, which otherwise could have killed many.

Symptoms of rabies

1. High fever
2. Fear of water (hydrophobia)
3. Convulsions

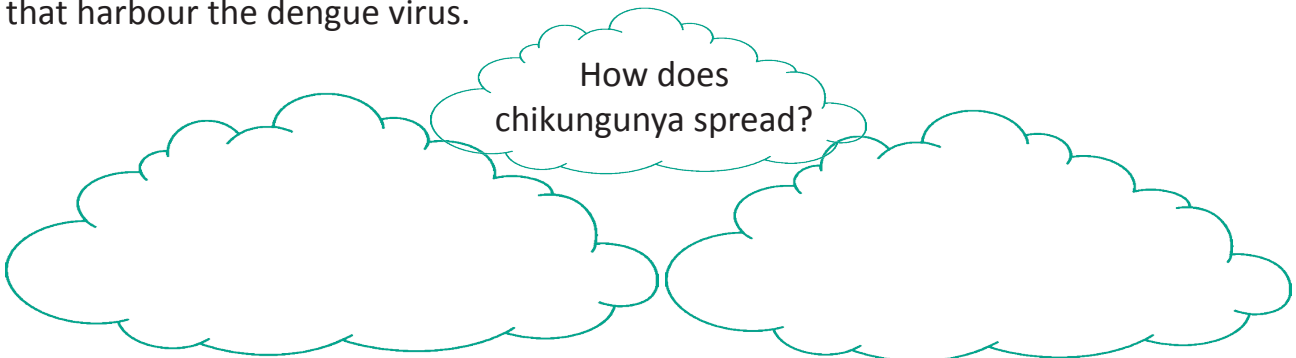


Mosquito causing dengue

Dengue is a viral disease that is transmitted by mosquito bite. The *Aedes aegypti* mosquito that is generally active during early mornings and evenings is the vector transmitting the virus. The symptoms of the disease are high temperature, pain behind the eyes, fatigue, severe head ache, muscular pain and rashes. The person affected has to take plenty of fluids and follow the instructions of the medical practitioner.

Effective vaccination for dengue has not been discovered yet. The best way to prevent dengue is to prevent stagnation of water in and around our place. Water collected in discarded water bottles, tyres, small pots and containers can also breed the mosquitoes that harbour the dengue virus.

How does chikungunya spread?



Diseases caused by fungi

What is fungus?

Ring worm infection and athlete's foot are two common diseases caused by fungi.

Ring worm has got nothing to do with worms. It has got its name from the circular or ring like rash that it causes on our arms, legs and the back.

Athlete's foot is a fungal infection that is characterized by the itchy, scaly skin between the toes.

Both are caused by fungi and can be transmitted by direct contact or from using the clothes and materials of an infected person.

They can best be prevented by keeping ourselves clean and dry.

Some fungal infections can also cause stomach and respiratory problems.



Athlete's foot

Can I draw an amoeba?

Diseases caused by protozoans

Some common diseases caused by protozoans are malaria, amoebiasis.

Amoebiasis is caused by the protozoan amoeba. It thrives on stale food, and enters our body when we consume it. It causes stomach cramps, diarrhoea.



Anopheles



Enrichment

A vector is a living organism that transmits a pathogen from one to another by carrying it in its system. E.g., mosquitoes.

Amoebiasis can be prevented by avoiding stale food, eating food only from hygienic places and by washing our hands with soap and water after using the wash room.

Malaria is caused by the protozoan Plasmodium falciparum and Plasmodium vivax. The organism enters the human body through mosquito bites.

The female Anopheles mosquito is the vector for the parasite. Symptoms of malaria are high fever, chills, head ache. Quinine, obtained from the bark of cinchona tree is the drug of choice for treating malaria.

Do the malarial and dengue vector breed in the same kind of water?



Malaria can be prevented by keeping our surrounding free of water stagnation, to avoid the breeding of mosquitoes. We do not have effective vaccinations to prevent such diseases.

Diseases that can be prevented by avoiding water stagnation??

Diseases caused by worms

There are parasitic worms like the tape worm and the hook worm that can live in our stomach. These worms enter our body when they are eggs through contaminated water or food that has not been prepared hygienically. The worms take away the nutrients from our body and make us anaemic. The lack of nutrients can lead to a host of problems to our health.

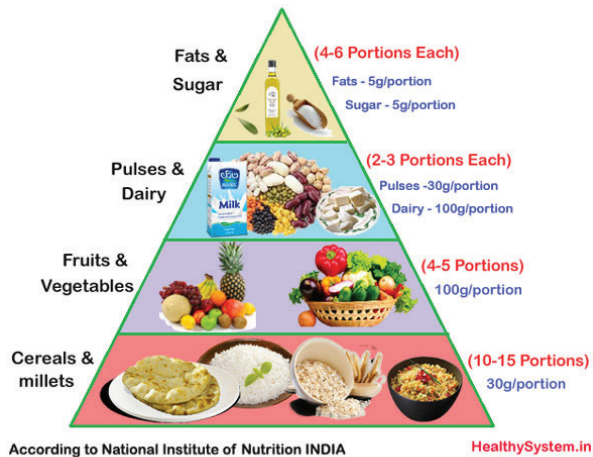


Hookworm

Elephantiasis or filariasis, is a worm infestation that can happen through mosquito bites. The disease lasts a long time and the swelling on the arms/legs sometimes remain for a life time.

Hence it is best to avoid stagnation of water in which the mosquitoes breed to prevent such diseases.

Protection from infectious diseases

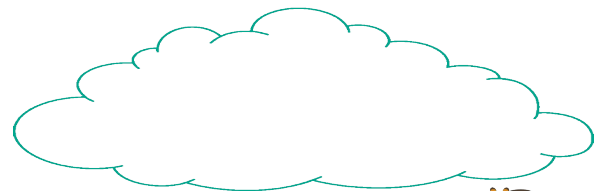
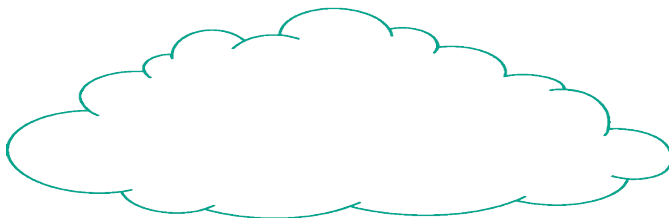


Balanced Diet pyramid

Immunity is the ability of the body to fight against infections. When our body encounters an harmful organism, it starts fighting against it. It succeeds most of the times and hence we do not fall sick. Sometimes, the body is not able to overcome the threat and we fall ill.

If our body does not have the right kind of nutrients, it finds it difficult to fight against the attacking pathogen. Hence, eating a balanced diet is important to remain healthy.

If we live in an unhygienic environment or do not follow hygienic practices, the number of organisms that our body has to face might be more than what it can actually fight



against. Thus, to prevent falling sick, we have to keep our environment clean. Some infectious diseases can be prevented by taking vaccines on time.

Acute and Chronic diseases

Some diseases occur all of a sudden and cause severe symptoms such as high fever, body ache etc. When treated appropriately the diseases do not last long. These are called **acute diseases**. E.g. common cold, influenza.

Some diseases continue to be a part of our system for a very long time, sometimes even a life time. Such diseases are called **chronic diseases**. eg. arthritis, some heart diseases.

Some diseases like polio, though does not last long, can cripple a person for life.

Non-communicable diseases/Non-Infectious diseases

There are some diseases that are not caused by pathogens. They do not spread from one person to another. Such diseases are called **non-communicable diseases**. Non-communicable diseases can be caused by **improper nutrition**, not practicing a correct **life style** and also due to **hereditary causes**.

Hereditary diseases are disorders that are passed from one generation to another.

As we have seen earlier vitamins and minerals are required in small quantities by our body. But if they are not available in sufficient amounts, it can lead to diseases. Diseases that are caused due to deficiency of nutrients are called **deficiency diseases**.

S.no.	Vitamins and minerals	Deficiency Disease
1)	Vitamin A	Night blindness
2)	Vitamin B	Beri beri
3)	Vitamin C	Scurvy
4)	Vitamin D	Rickets
5)	Iron	Anaemia

Lifestyle diseases can be prevented by adopting a healthy life style, which involves adequate physical activity, healthy diet and a stress-free environment. Lifestyle diseases like diabetes and hypertension last a life time too and hence are chronic diseases. They are best avoided.



What is anaemia?
Anaemia is a condition where a person lacks enough red blood cells or haemoglobin. This can lower immunity and also make the person feel tired and weak.

What do you mean by blood group?

Physical activity is an important component of our life style. If we do not have adequate physical activity, it is difficult for blood to travel to all parts of the body. This in turn can make us sick. Lack of physical activity will lead to a number of problems like obesity, hypertension and diabetes. Good exercise and yoga help us to keep our mind and body healthy. Playing in early morning sunlight helps the body produce enough vitamin D, to keep our muscles and bones healthy.

Malnutrition is the condition where the person does not get enough nutrients from food. This can be due to poverty or improper food habits.

Lack of nutrients can harm our immune system. If our immune system is healthy, we would not be affected by most of the infectious diseases too. It is important to remember that our immune system works all 24 hours to keep us healthy.

When we eat more than what is required for the body. It can lead to obesity. This is called **overnutrition**. Overnutrition is to be avoided as much as malnutrition.

Sometimes we consume food that does not contain nutrients required for healthy functioning of our body. These junk foods do not provide us nutrients, but harm the body. They harm our digestive system and do not help in elimination of waste from the body. This leads to greater trouble.

Diseases like hemophilia, which result in uncontrolled bleeding, are an example of **genetic disorder**. Genetic disorders are passed on from one generation to another.

While diseases caused due to improper life style and infectious diseases can be prevented to a large extent, it is difficult to prevent genetic disorders.

However, the Government is now trying to educate people on such diseases so that their occurrence can be minimized among the coming generation.

Prevention of diseases

Communicable diseases can be prevented by

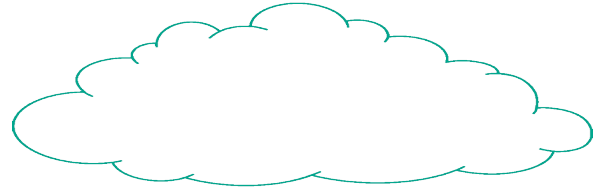
- a) Consuming a balanced diet, to help our immune system be up and ready to fight any pathogen.
- b) Maintaining a clean environment, to prevent multiplication of carriers (e.g., houseflies) and vectors (e.g., mosquitoes).
- c) Taking periodic vaccinations as applicable.

List of physical activities that can be practised



Life style diseases can be prevented by

- a) Consuming a balanced diet to avoid over nutrition, under nutrition and hence the resultant obesity or deficiency.
- b) Practising regular physical activity to maintain a healthy body weight, healthy circulation of blood.



SUMMARY

- Health is a state of complete physical, mental and social well-being, not merely the absence of disease.
- Diseases could be caused due to pathogens or improper life style. Some diseases could also be hereditary.
- Organisms that cause infectious diseases are called pathogens. Bacteria, virus, fungi, protozoa or a worm can be a pathogen.
- Keeping food and water covered from contamination, washing our hands, keeping our nails short and covering our nose and mouth while coughing or sneezing can prevent infectious diseases.
- Common diseases caused by bacteria are tuberculosis, typhoid and dysentery and are treated using medicines called antibiotics.
- Viruses are a group of organisms that are neither living nor non-living. Common diseases caused by viruses are common cold, measles, mumps, chicken pox, Polio and COVID-19.
- Small pox was the first viral disease to be eliminated from the Earth by universal vaccination.
- Ring worm infection and athlete's foot are two common diseases caused by fungi.
- Some common diseases caused by protozoans are malaria, amoebiasis.
- Elephantiasis or filariasis, is a worm infestation that can happen through mosquito bites.
- Immunity is the ability of the body to fight against infections.
- Acute diseases occur all of a sudden and cause severe symptoms. E.g. common cold, influenza.
- Chronic diseases continue to be a part of our system for a very long time, eg. arthritis, some heart diseases.



- Diseases that are not caused by pathogens and do not spread from one person to another are called non-communicable diseases. They can be caused by heredity, improper nutrition or bad life style.
- Diseases that are caused due to deficiency of nutrients are called deficiency diseases. eg.: Scurvy, rickets and night blindness.
- Lifestyle diseases like diabetes and hypertension can be prevented by adopting a healthy life style, which involves adequate physical activity, healthy diet and a stress-free environment.
- Malnutrition is the condition where the person does not get enough nutrients from food. This can be due to poverty or improper food habits.



I. Fill in the blanks

1. Diseases could be caused due to or.....
2. Diseases that are transmitted from one person to another are called
3. Insects like flies areof diseases.
4. Tuberculosis is a disease caused by bacteria that commonly affects our
5. Diseases caused by bacteria, are treated using medicines called
6. Polio is a disease caused by virus.
7. The first viral disease to be eliminated from the Earth by universal vaccination is
8. If bitten by a stray dog or cat, we need to take the prescribed course of
9. Quinine, obtained from the bark of is the drug of choice for treating malaria.
10. Eating a is important to remain healthy.
11. Over eating can lead to
12. Genetic disorders are passed on from

II. Give two examples of

1. Diseases caused by bacteria
2. Diseases caused by virus



3. Diseases caused by Protozoans
4. Diseases caused by Fungi
5. Diseases caused by worms
6. Acute diseases
7. Genetic Disorders
8. Problems caused due to over nutrition
9. Diseases that can be prevented by vaccination
10. Non-communicable diseases

III. Find out the diseases spread by me

1. Mosquito : _____
2. Rabid dog : _____
3. Housefly : _____

IV. Match the following

a.

S.No	Disease	Spread through
1	Typhoid	Direct Contact
2	Rabies	Water
3	Tuberculosis	Insect
4	Malaria	Animal
5	Athlete's Foot	Air

b.

S.No	Vitamins and minerals	Deficiency Disease
1	Vitamin A	Anaemia
2	Vitamin B	Rickets
3	Vitamin C	Beri beri
4	Vitamin D	Scurvy
5	Iron	Night blindness



V. Complete the table

Name of the disease	Caused By	Symptoms	Can be avoided by
Malaria			
Dengue			
Ring worm			
Athletes foot			
Amoebiasis			

VI. Answer the following

1. How can you keep yourselves healthy?
2. What are Pathogens? Give examples.
3. a) What causes Polio?
b) How does the pathogen enter our body? which system does it affect?
c) There has been no case of polio reported since 1977. But we continue to vaccinate children against it? Why?
4. Differentiate between -(i) infectious and lifestyle diseases (ii) acute and chronic diseases.
5. How are flies carriers of diseases?
6. Why is it important to vaccinate pet dogs and cats?
7. Why should we prevent water stagnation near our houses?
8. What are parasitic worms? Give examples.
9. How does eating a balanced diet and keeping our environment clean helps us fight diseases?
10. Define immunity. How does it help us fight diseases?
11. How can physical activities help us maintain good health?



VII. Classify the diseases as life style, genetic and deficiency diseases

Scurvy, Hypertension, Aneamia, Diabetes , Haemophilia, Beri Beri, Rickets

LIFESTYLE DISEASES	GENETIC DISEASES	DEFICIENCY DISEASES

VIII. Activity

1. Name two diseases that are common during (a) monsoon, (b) summer.
2. Are they caused by pathogens? If yes, name them.
3. If yes, how do they spread?
4. Observe the environment in which you live to identify whether a few changes to it can prevent the occurrence of those diseases.





How do you float?

9



Expected Learning Outcomes

Students...

know that a few objects sink/float in water, some substances are soluble in water while some are not, some liquids are miscible in water while others are not

know the meaning of density, matter, mass, solute, solvent, miscible and immiscible liquids, viscosity

know why the Dead Sea is named so, water is called the universal solvent

understand how arrangement of particles in an object decides its density, viscosity influences the flow of liquids

understand why one can't drown in the Dead Sea, oil floats on water, a solute dissolves in a solvent without increasing its volume, an object floats or sinks in water



FLOATING ON THE DEAD SEA

Oh! what a sight to see the Dead Sea
 So clear and glimmering in the Sun
 You will float on this dense space of water
 On your tummy or your back
 You will float on a sea of minerals
 Packed with salts and black mud
 Which you can paint on your body
 To purify your mind in space and time
 When you are done with dipping in the sea
 A shower with fresh water will soothe you
 Trickling the salts from your fragile body
 To give your face a new smile
 Floating on the Dead Sea
 You should do once in a lifetime



- *Laiakini Waqanisau*



Rohan and Ranjith were classmates and were also best friends. On a Sunday, Rohan was busy playing in a tub of water under the pretext of having his bath. He was trying to push a plastic mug full of water into the tub and enjoying the bounce with which it was coming up. As he was playing, his mother called him to say that his friend had come to play. In his excitement to see his friend, he dropped the bar of soap that he had in his hand into the tub of water. He observed that the soap moved down to the bottom of the tub. He fished it out, completed his bath and rushed to meet his friend.

As he was getting ready to play, he was also thinking about why the mug of water always came up and why the soap bar went down. He has always observed that the mug floats in water. Having these thoughts on top of his mind, he went to play with Ranjith and his other friends.



Children playing cricket on the terrace



They enjoyed a game of cricket, first on the playground. When the weather became suddenly cloudy, they quickly moved to Rohan's home and continued the game on the terrace. The children were taking their turns to bat and bowl.

When Ranjith hit a shot, the ball went straight into a rain water pipe which was provided to drain the rain water from the terrace. Vishal sprinted down to retrieve the ball from the ground floor expecting it to come down the pipe, but could not find it. He rushed back to the terrace disappointed. Children understood that the ball had got stuck in the pipe. They were perplexed, about how to retrieve the ball. As they did not have a ball to play, they decided to disperse. Since it had started raining, Ranjith's mom called him over the phone and suggested that he stays in Rohan's home till she picks him up

Rohan: Ranjith, I am happy you stayed back. What shall we do now? It is raining and we cannot play outside. Shall we play some indoor games?

Ranjith: Ok. What shall we play?

Rohan: Let's play ludo.

He comes back with the board game along with a book on Science Experiments.

Ranjith: Is that an addition to your collection of books Rohan? It looks colourful and interesting. We will play for half an hour. Shall we go through the book after that?

Rohan: Sounds good to me Ranjith. It's fun learning together.



They play a round of ludo and settle down to skim through the book

Ranjith: The book has a lot of experiments described. Shall we try one or two, if we have the needed materials?

Rohan: Yes Ranjith.

They flip through the pages and stop at a page that describes floating and sinking.

Rohan: Shall we read this Ranjith? This morning, as I was playing in a tub of water, I noticed that I was not able to sink the plastic mug in water how much ever I tried to. I see one similar experiment here. Shall we try it?

They started doing the experiment. You can also try doing it

ACTIVITY

Fill water in a bowl or a tub. Place a wooden ice cream stick, a plastic spoon on it and observe.

Place a stainless-steel spoon (similar to the plastic spoon in size), a piece of chalk, an eraser.

Note down your observations in the tabular column given.

S. No.	Object	Floats/ Sinks
1		
2		
3		
4		

Rohan and Ranjith note down their observation of what floats and sinks. Have you marked your observations?

Let us see what they are reading through to find out the reason for the observation

Rohan: Ranjith, did you observe that some objects float while others sink in water.

Ranjith: Yes. But why is it so? Is it the weight of the object, that makes it float or sink? Or is it the quantity of water?

Rohan: We will try pouring some more water into the tub.

Ranjith: But the plastic spoon floats and the stainless-steel spoon sinks, even now.

Rohan: So it does not depend on the quantity of the liquid. It should be something with regard to the object.





Ponder

A ship floats in water whereas a nail sinks. Why?



Rohan: Shall I read the explanation given aloud Ranjit?

Ranjit: Yes Rohan.

Rohan reads

Rohan: An object that is denser than water sinks, while the object that is less dense than water floats.

Ranjit: Rohan, now we have to find out what dense means.

Rohan: Ok. Let us move to the index

to see whether there is something to read about it. Ranjit, see there is something given as density. Shall we look at it?

Ranjit: Sure. Can you please read it aloud?

Rohan: Density is the amount of matter present in unit volume of a substance. This is even more confusing Ranjit. What shall we do now?

Ranjit: We will look at what matter is?

Rohan: That is a good idea. Let me go to that page. Ranjit, matter is anything that has mass and occupies space.

Ranjit: I think we can ask our EVS teacher tomorrow regarding this. Now that it is only drizzling, can we go to the terrace to check whether we can retrieve the ball from the pipe, so that we can continue playing.

They go to the terrace. When they move closer to the drain pipe, they find the ball floating in water in the pipe and quickly pick it up.

Rohan: The ball came up because the pipe got filled with water due to the rain and the ball started floating in it.

Ranjit: Yes Rohan. It also means that the ball is less dense than water.

Rohan: True. Would all balls float in water? I have a basketball. Let us check whether that floats or sinks.

They quickly go home, take out the basketball and put it in a tub of water. They are surprised to see that the ball floats

Ranjit: So, we can conclude that it is less dense than water.

Rohan: Tomorrow we shall ask our teacher about density.

Next day in the EVS class, the teacher enters and greets the class with a "Namaste"



Rohan: Acharya, we came across a term “density” in one of the science experiment books. May I request you to explain that acharya.

Acharya: Definitely. We shall first try to understand what matter is before we talk about density.

Matter is anything that has mass and occupies space.

Rohan: What is mass acharya?

Acharya: Mass is the amount of matter present in a substance. For example, air is matter. How do we know that air occupies space? When we inflate a balloon, the air occupies space in the balloon for it to get inflated. Air has mass. Take a measuring scale. Tie a thread at the centre of the scale. Hold the scale, at the centre, using the thread. Tie two inflated balloons on either side of the measuring scale. Let us deflate one balloon by piercing with a pin. The side of the scale on which we have balloon with air goes down thus implying that air has mass. We can perform this experiment in the class now to validate, what I told you now. (The class gets ready to do the experiment)

To understand density, we need to know that all substances are made of tiny particles. These tiny particles may be either close to each other or away from each other.

When the particles are close to each other, we say that it is denser as there are more particles occupying a smaller space. When the particles are far away from each other, we say that the object is less dense.



Rohan: Oh! That is interesting acharya. One day when I dropped a pencil in a bucket of water, it was easy to retrieve it as it was floating. Now I have understood why.

I want to check whether a safety pin would float or sink in water.

Acharya: Good Rohan. Children, have you all heard of the Dead Sea?

Ravi: Yes acharya. I have heard, but why is it called the Dead Sea?

Acharya: It is called so because, no life form exists in it.

Ram: Why is it so acharya?

ACTIVITY

Check whether the following float or sink in water:

- a) Stainless steel safety pin
- b) Paper plate



Acharya: The water is so dense that almost everything else is less dense than it. So, everything floats in the Dead Sea and nothing drowns. No organism survives in the Dead sea as huge amount of salt is dissolved in it.

Varun: I have observed all substances dissolving in water. Am I correct acharya?

Acharya: Now let us perform an experiment to check whether all substances dissolve in water. Let me get each of you 4 beakers, glass rods to stir, water, salt, sugar, chalk powder and sand. I will write the steps on the board. You can follow them and perform the experiment.

Steps for the Experiment:

- Take four beakers
- Take the same or almost the same quantity of water in each of the four beakers
- To the water in one beaker add salt and in another beaker add chalk powder
- To the third beaker add sugar and to the fourth beaker add sand
- Stir all the beakers with a glass rod
- Note down your observation on how the liquids appear before and after the addition of substances.
- List your inferences from each of your observations.

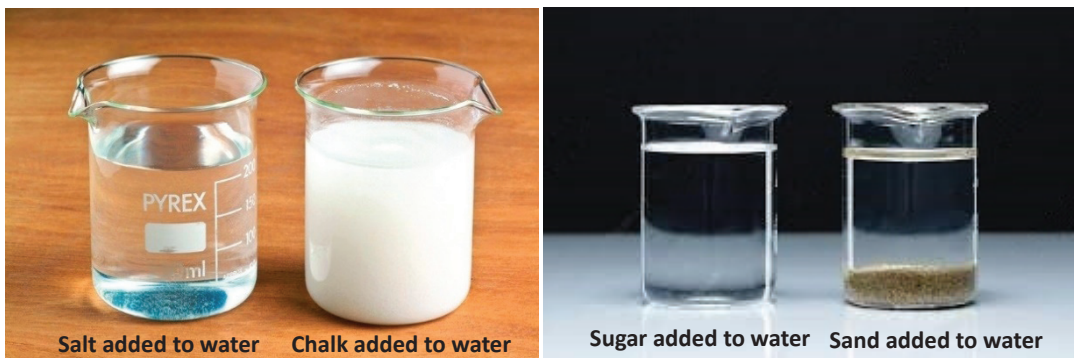
OBSERVATION

- a) Salt : _____
- b) Chalk powder : _____
- c) Sugar : _____
- d) Sand : _____

INFERENCE

- a) Salt : _____
- b) Chalk powder : _____
- c) Sugar : _____
- d) Sand : _____

The children do as instructed.



Acharya: Very good. I see that all of you have completed the activity. Now read your observation when I call your name. Maya...

Maya: The water was clear first. When I added salt to the first beaker and stirred well, it continues to be clear. But, the other one to which I added chalk, is not clear, it appears cloudy.

Acharya: Jiya, read out for water + sugar and water + sand.

Jiya : I see a clear solution, in the beaker in which sugar is added. The other one to which I added sand, appears turbid.

Acharya: You both have recorded the observation in good detail. Is there anyone for whom the observation is different?

Children: No acharya.

Acharya: : Now let us try to understand the reason for our observations. When you added salt or sugar to water, what happened to it?

Vignesh: The salt and sugar dissolved in water.

Acharya: Good. Where have the salt and sugar gone, when we say it is dissolved?

The children remain quiet

Acharya: : Let me draw how particles are arranged in water.

What do you see between the particles of water?

Children: There is space.

Acharya: Now the salt and sugar particles that you added, have occupied those spaces. Thus, we say it has dissolved in water.

Karuna: Does the same thing happen when I add sugar to milk?

Acharya: Yes. When you add sugar to milk, does the quantity of milk increase?

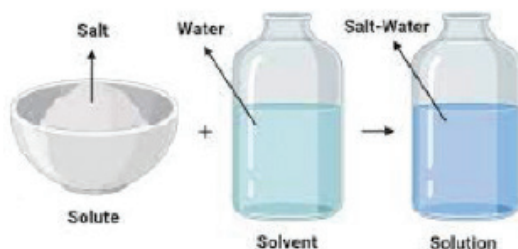
Karuna: No acharya.

Acharya: Good observation. Since the solute occupies the space between the particles of the solvent, the volume does not increase.

Vidya: But acharya, what is a solute? I have heard only the word solution.

Acharya: What is a solution?

Vidya: When we add salt to water, we get salt solution. When we add sugar to water it is sugar solution.



Acharya: True, a solution has a solute and a solvent. That which is present in larger quantity in a solution is the solvent and the one in smaller quantity is the solute. Here water is the solvent and the salt is the solute. We say that sugar and salt are soluble as they dissolve in water. We tried to dissolve chalk powder and sand and they did not. We say that chalk powder and sand are insoluble in water.

Solute + Solvent -----→Solution

Water is the most commonly used solvent as it dissolves almost everything.

Varun: Do only solids dissolve in a liquid acharya?

Acharya: No. Have you all observed what happens when sugar solution and salt solution are mixed?

Varun: Shall we try it once acharya?

Acharya: Go ahead and do it. Don't forget to record your observation. What is the observation?



Enrichment

Water is called the universal solvent because it can dissolve most of the substances.

Experiment

- Take three beakers.
- Prepare salt solution in one and sugar solution in another.
- Mix both the solutions in the third beaker.
- Note down your observation.

OBSERVATION _____

Vivek: They have mixed completely. We are not able to differentiate between the two.

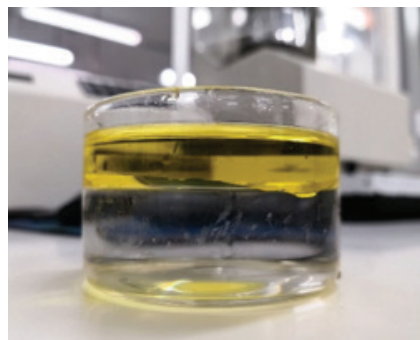
Acharya: When two solutions mix completely, we say they are **miscible** with each other. Now let us perform a simple experiment to show how immiscible liquids behave.

Experiment

- Take water in a beaker
- Add a crystal of copper sulphate to colour the solution
- Add a few drops of coconut oil to it and stir well
- Note down your observation

OBSERVATION _____





Immiscible liquids

I added copper sulphate crystals (blue coloured salt) to water to help you distinguish between the water and oil. Now observe and tell me whether they have mixed with each other thoroughly.

Children: No acharya. There are two layers.

Acharya: Liquids that do not mix with each other thoroughly are called **immiscible liquids**. For example, water and oil are immiscible liquids.

Among the two liquids, water and oil, which one floats?

Children: Oil, acharya.

Acharya: So, what is your inference regarding the density of oil compared to water?

Vandita: Oil is less dense than water.

Kalpana: Oh, that is why when it rains, and if there is an oil leak from vehicles, we see oil floating on water.

Acharya: Good learning Kalpana. That is how you need to relate what you learn in class with what you observe.

Kalpana: Thank you acharya

Acharya hears a scream from one of the students that oil has spilled from the beaker.

Acharya: One needs to be cautious while handling apparatus and substances in the laboratory. But, it's okay with these materials as they would not cause any harm. We can clean it up

Suganti: Acharya, I have an observation to make in this. Both oil and water got spilled. But, water seems to be flowing more quickly than the oil.

Somu: Yes acharya. That's true. Water has already flowed down the table. But, oil is reaching the edge of the table only now.

Acharya: In science every observation is a learning. Liquids like water that flow more easily are less viscous than the ones that do not flow easily like the oil. Let us understand this by doing a simple experiment.

Acharya performs and calls out the steps of the experiment

Acharya (shows a burette to the class and says):

This is a burette.

I am going to take 50 mL of castor oil in one and 50 mL of water in another.



Burette



I am going to allow both the liquids to flow out of the burette.

I am going to start a stop watch as soon as I open the nozzle to record the time taken for each of them to flow. Can anyone share your observation?

Srikanth: The oil has taken more time to flow out than water acharya.

Acharya: Yes, so oil is more viscous than water.

Sarvesh: How interesting science is! We are able to observe all the phenomenon, that we read in the books.

Acharya: Let us now conclude by understanding the different properties of water. Water has no taste, colour or smell. Water exists in three states, solid, liquid and gas. Water is a universal solvent

The bell rings.

Vinay: Acharya, the class got over so soon. It was very interesting.

Acharya: I too enjoyed your active participation. Children, learn the definitions of all the new terms that you learnt today for better understanding.

Children: Namaste acharya. Thank you.

SUMMARY

- An object that is denser than water sinks, while the object that is less dense than water floats.
- Density is the amount of matter present in unit volume of a substance and mass is the amount of matter present in a substance.
- When particles in an object are close to each other, we say that it is 'denser' as there are more particles occupying a smaller space. When the particles are far away from each other, we say that the object is less dense
- Dead Sea is found between Israel and Jordan. The water is highly dense due to the huge amount of salt dissolved in it. So, everything floats in the Dead Sea and nothing drowns. No organism survives in the Dead sea as huge amount of salt is dissolved in it.
- A solution has two parts, a solute and a solvent. That which is present in larger quantity in a solution is the solvent and the one in smaller quantity is the solute.
- Liquids that mix completely, with each other are called miscible liquids. eg.: salt solution + water.
- Liquids that do not mix with each other thoroughly are called immiscible liquids. eg.: oil + water.
- Viscosity is the property of a liquid that describes how fast or slowly it will flow.
- Water is a universal solvent and it exists in three states, solid, liquid and gas.





I. Fill In the Blanks:

1. An object that is denser than water _____, while the object that is less dense than water _____.
2. Density is the amount of _____ present in _____ of a substance.
3. No organism survives in the Dead sea as huge amount of _____ is dissolved in it.
4. The 2 parts of a solution are _____ and _____.
5. The larger quantity in a solution is the _____ and the one in smaller quantity is the _____.
6. Water is called the universal solvent because it can _____ most of the substances.
7. Liquids that do not mix with each other thoroughly are called _____.
8. Oil is more _____ than water.

II. Choose the correct answer

1. Solution = _____ + solvent.
a) water b) solute c) oil d) sugar
2. The quantity of milk _____ when we dissolve sugar in it.
a) increases b) decreases c) remains the same
d) sometimes increases, sometimes decreases.
3. Which among the following are insoluble in water
(i) powdered coal (ii) cut beans (iii) salt (iv) sugar
(a) i and iv b) ii and iii c) iii and iv d) i and ii
4. Varun added a pinch of salt to a bowl of clear soup. Salt is the
a) solution b) solvent c) solute d) none of the above
5. Identify the pair of immiscible liquid.
a) water and lemon juice b) milk and mango juice
c) kerosene and water d) grape juice and orange juice



III. Unscramble the words

1) TIEYDNS

D							
---	--	--	--	--	--	--	--

2) ILBCIMESIM

I									
---	--	--	--	--	--	--	--	--	--

3) TELNOSV

S						
---	--	--	--	--	--	--

4) NOIULOST

S							
---	--	--	--	--	--	--	--

5) VSOLISDE

D							
---	--	--	--	--	--	--	--

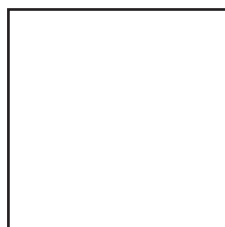
6) OUSSIVC

V						
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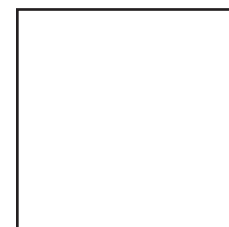
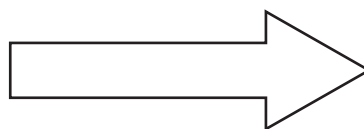
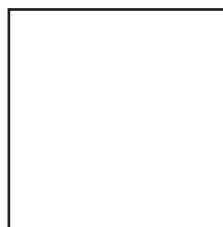
IV. Name the Following

- 1) The sea in which none can drown.
- 2) Anything that has mass and occupies space -
- 3) Solutions which completely mix with each other.
- 4) It exists in all three states, in nature.
- 5) Present in larger quantity in a solution.

V. Draw particles in the boxes from less dense to more dense



LESS DENSE



MORE DENSE



VI. Match the Following

1.	Density	amount of matter present in a substance
2.	Mass	No organism survives
3.	Dead Sea	amount of matter present in unit volume of a substance
4.	Solution	Liquids that do not mix with each other thoroughly
5.	Immiscible liquids	has a solute and a solvent

VII. Answer the Following

1. Define density.
2. What is mass?
3. Why is water known as the universal solvent.
4. Between stainless steel pin and wooden pencil which is denser than water. Describe an experiment to establish the same.
5. What are immiscible liquids?
6. Does the quantity of water change when we add salt to it? Why?
7. What is a solution?
8. List a few properties of water.
9. Where is dead sea? Why is it called so?
10. What are the different states in which water exists?

VIII. Activity

Take some water in a glass. Try to dissolve the following substances in water. Observe what happens and record them in the table given. Mark [✓] in the appropriate box.

S. No.	Substances	Dissolves in water	Does not dissolve in water
1.	Salt		
2.	Sand		
3.	Butter		
4.	Tea powder		
5.	Vinegar		
6.	Flour		
7.	Milk		
8.	Turmeric		
9.	Oil		
10.	Wax		



IX. Locate the Following in the Grid:

- 1) Ability of the liquid to flow.
- 2) The universal solvent.
- 3) The amount of matter in a substance.
- 4) Anything that has mass and occupies space.
- 5) The component of a solution that is present in small quantities.
- 6) Liquids that do not mix with each other well.

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





Know your location on Earth

10



Expected Learning Outcomes

Students...

know who makes a map, that equator is the longest latitude

know what is/are earthquakes, aftershocks, National Disaster Response Force, a relief map, a political map, an orbit, latitudes and longitudes, continents, oceans

understand the dos and don'ts during an earthquake, earth's rotation and revolution, the **reason for** occurrence of days and nights, change of seasons, the **differences** between latitudes and longitudes, **how** grids help us, **what** (a) torrid zone, (b) temperate zone, and (c) frigid zone are

locate state/s, capital/s, rivers, tributaries and other geographical divisions mentioned in this lesson on a political map of India.



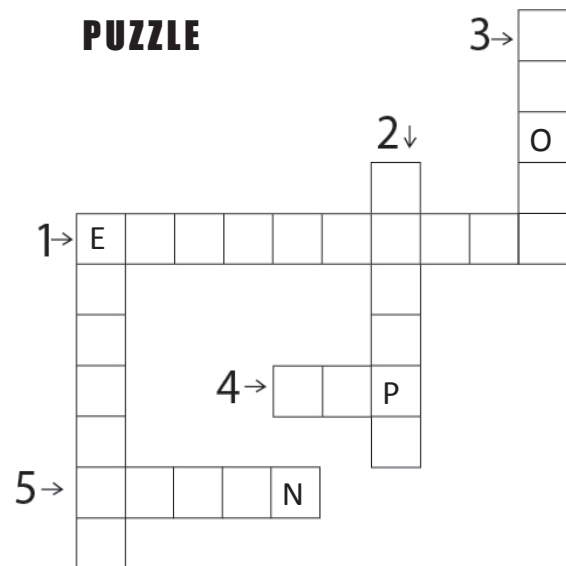
ACROSS:

1. I can move things even though I can't be seen but I'm not the wind
I'm measured on a special scale but I don't weigh anything
I can knock down buildings but I'm not Godzilla
What am I?

4. I am used by hikers to follow a trail
I can be used when driving to find your way
Everything in me is drawn to scale
What am I?

5. I look flat but I am deep
Hidden kingdom I shelter
At times I'm beautiful
I can be calm, angry and turbulent
What am I?

PUZZLE



DOWN:

1. I am imaginary and not real
I run from east to west
I divide the earth into northern and southern hemisphere.
What am I?

2. I am the only continent with no deserts
The smallest country in the world is found here
Which continent am I?

3. I show all the world in just one swirl
I show the desert
I show the land
I show each sea
What am I?



Arvind had learnt a new game in his EVS class using his book of atlas. He and his sister decided to play the game one day sitting in front of the television, trying to locate the places, that they hear in the world news. It is a game, that they enjoy playing, as it gives them the thrill of finding new places on the world map. It also helps them to remember the news better when it comes for discussion in the class the following day.

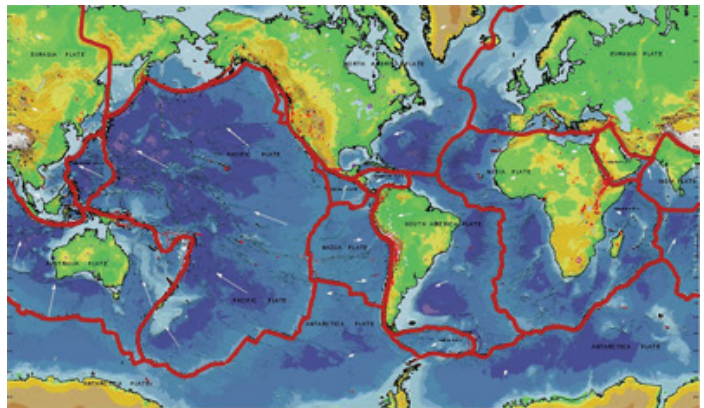
One day (6th Feb, 2023) as they were writing down the names to locate it on the map, they heard the news that a terrible earthquake had struck Turkey. The quake had a magnitude of 7.8 and was the worst in history since 1939, in that area.

Arvind: How unfortunate! I feel sad to hear that many have lost their lives and homes in this earthquake. Before we locate Turkey, what is an earthquake?

Aruna: We will find out where mauusa (mother's elder sister's husband in Odiya) is and ask him.

They find mauusa reading a book in his room.

Arvind: Mauusa, there was an earthquake in Turkey and many have lost their lives. Can you explain how it happens?




Map showing the boundaries of tectonic plates

Mauusa: The earth's crust is made of plates called the tectonic plates. These plates are always moving slowly. But at times they collide with each other thereby creating friction. The pressure at the point of friction is immense and it releases seismic waves resulting in an earthquake. We experience the shaking of the ground during an earthquake.

Some regions of the earth where the tectonic plates are moving rapidly are called earthquake prone regions.

Ponder



Which parts of India are earthquake prone?

Earthquake is a natural disaster like the cyclone, forest fire, hurricane etc.

Arvind: Can we not predict an earthquake like how we are able to predict a cyclone mauusa?

Mauusa: Unfortunately, we are not able to till now. However, we have now understood the reason for a quake. We are also able to measure its intensity. As you saw in the news, it is measured on a scale called a Richter scale.



The place where the intensity of the earthquake is maximum is its epicenter. People feel tremors miles away from the epicenter depending on the intensity of the earthquake.

Aruna: I also heard in the news that there were mild tremors after the quake. I understood that they were aftershocks. Please tell me more about it.

Mauusa: After a strong earthquake the tectonic plates readjust themselves with smaller movements to settle down. These smaller movements are mild earthquakes and are called **aftershocks**. Though they are milder than the first earthquake, a building that has been weakened by the quake can collapse due to an aftershock. So, one needs to be very careful till the aftershocks settle down.

Aruna: Are there ways to prevent an earthquake mauusa?

Mauusa: No, there aren't any. But there are measures that we can follow to protect ourselves during an earthquake.

If you feel a tremor, move outside the building that you are in. An open space is the ideal spot. You would have seen "Safe Assembly Points" in many places. We rush to those points in case of a natural or man-made disaster.

If you are not able to move out of the building, see that you are under a cot or sofa. Place yourself in such a way that what is around you would not fall on you directly.

Switch off all electrical appliances and gas stoves.

Use the stair case to move down instead of elevators.

Do not wait to pack your things to move out. People in quake prone zones generally have a bag packed with valuables, medicines for a few days and minimum clothes required and rush out grabbing it, without taking much time.

Above all, do not panic and crowd the exits. Instead you should move in order to get out quickly and reach the place of safety.

Arvind: I feel safe after knowing what to do in case of an earthquake.

Mauusa: The government has a well-trained National Disaster Response Force (NDRF), to swing into action in case of a crisis. In fact, we were one amongst the first to offer help to Turkey, in the form of materials, trained man power and medicines at this time of their need.



Arvind: The earth seems to have a lot of mysteries hidden. In fact, when we play with the atlas, we see a lot of markings on the maps, which we would like to know more about. First, I wonder who makes such elaborate maps, that seems like a lot of work to me.

Mauusa: They are done by **cartographers**. Maps that depict the physical features like the mountains, valleys, plains, etc. are known as **relief maps**. Maps that show how the world has been divided into countries and countries into states are known as **political maps**.

Aruna: But my teacher brought a globe to the class today. She said that it was better than a map, because it is a model of the earth.



Globe

Mauusa: The globe is a model of the earth. However, it is difficult to carry a globe. Imagine having different globes to show different features like how we do in maps. Would that be easy?

Aruna: Not at all mauusa. But when we look at the globe it is like looking at the earth. But I think the globe in our school is broken too, because it was tilting and it was held by a rod to make it stand.

Mauusa: Good you brought it up. The tilted globe you saw is not a broken one. The earth is actually tilted at an angle like how you saw in the globe in your school. This tilt is known as the axis. The earth rotates on its axis. Do you know that the earth rotates and also revolves?

Aruna: I have read, but I would be happy to listen to you about it.

Mauusa: The earth rotates on its own axis. Now stand up and move around yourself. This is called rotation. Imagine the table to be the sun. If you move around the table, you are revolving around it. The earth rotates on its axis and also revolves



Elliptical path of the planets around the Sun

around the sun. Remember that the path in which the planets move around the sun is called its orbit. The orbits are elliptical, i.e the path looks oval and not circular.

Arvind: I know that the rotation of the earth causes day and night.

Aruna: How can it be mauusa?

Mauusa: Now, let me take the globe out of my cupboard, put it on the table. Let us take a torch and keep it handy for the experiment.



The globe is the earth and the lit torch is going to be the source of light. Tell me what it is?

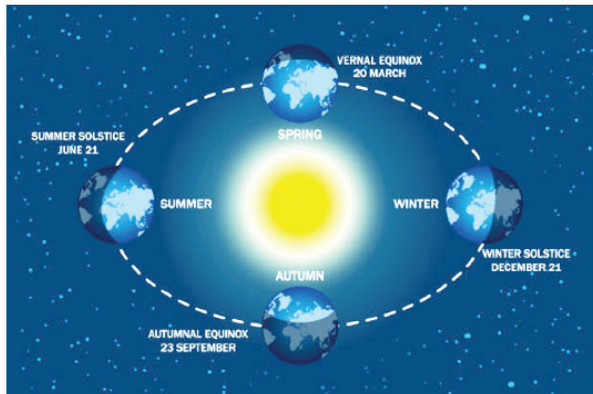
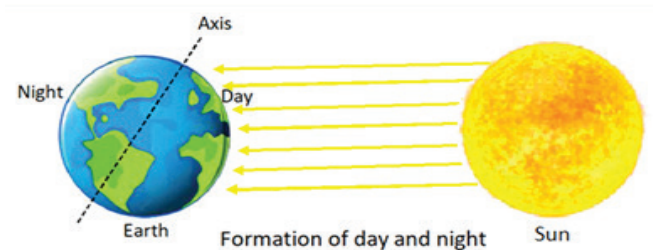
Aruna: It is the sun.

Mauusa: Now let us switch off the lights and switch on the torch. I am sure you know that the earth is opaque.

When we light the torch, the light illuminates one half of the globe and the other half remains dark meaning while one part of the earth has day, the other has night. Now let us rotate the globe like how the earth rotates. As it rotates, the other half which was dark earlier gets illuminated. Now, this part has day and the other has night.

Arvind: Fascinating. So, the rotation of the earth causes days and nights. I also understand why it is night in America, while it is day in India.

Aruna: What happens because of the tilting of the axis of the earth and the revolution of the earth mauusa?



Mauusa: Let us continue with the experiment. Let us first look at the revolution of the earth. As the earth moves around in an elliptical orbit, certain parts of the earth are close to the sun at certain periods of the year and far away during certain periods. When we are closer to the sun, we receive the warmth of the sun more and it is summer, when we are away, the warmth that is received is less and it is winter. Thus,

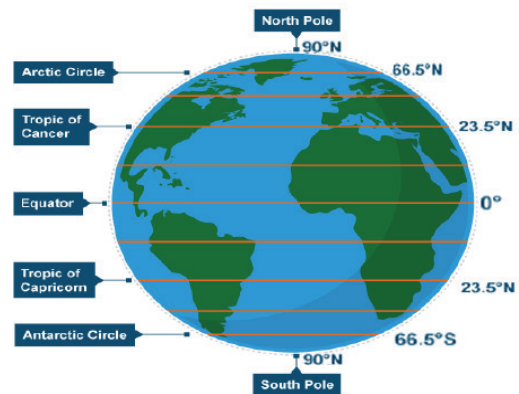
the revolution of the earth around the sun causes changes **in seasons**.

The tilt of the earth's axis results in specific climatic conditions in a place. To understand that better, let us look at the lines that have been drawn on the globe.

Aruna: I have learnt about them mauusa. They are latitudes and longitudes.

Mauusa: Do you know what latitudes and longitudes are?

Aruna: Latitudes are imaginary lines that run across the earth from east to west. Longitudes are imaginary lines that run from north to south.



Latitudes



Mauusa: Now let's look at the globe, can you find the longest latitude?

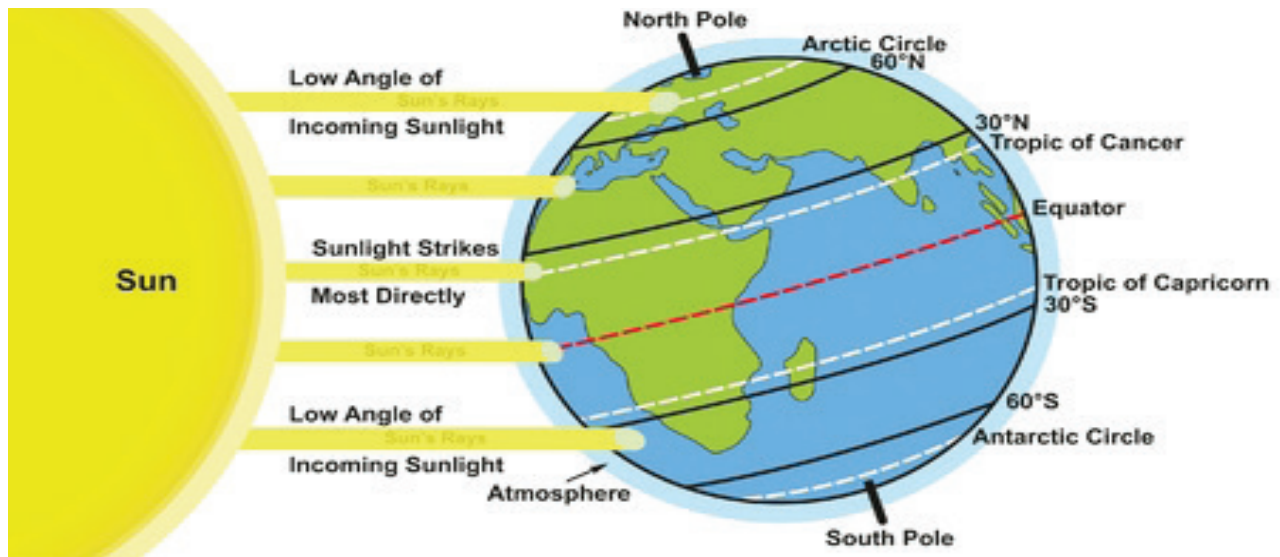
Aruna: (Pointing to the longest latitude), I think this is the one mauusa.

Mauusa: Good. The longest latitude is called the **equator**. Equator divides the earth into two equal parts, the northern and the southern hemisphere. Look at how the length of the latitudes change as we move away from the equator.

Arvind: Oh... it's amazing. The length of the latitudes decreases as we move away from the equator both in the northern and the southern hemisphere.

ACTIVITY

Find out the important latitude that passes through India.



Mauusa: Now look at the globe again. The latitude, that is at 23 1/2 degrees north, is called the **Tropic of Cancer**. The latitude that is at 23 1/2 degrees south is called the **Tropic of Capricorn**.

Arvind: But why do we have these imaginary lines? Though it is interesting to learn, there is a lot to remember for the examination, when we have all these.

Mauusa: (Laughs aloud) Latitudes help us to find the location of a place on the globe.

Arun: Hmm. I agree mauusa.

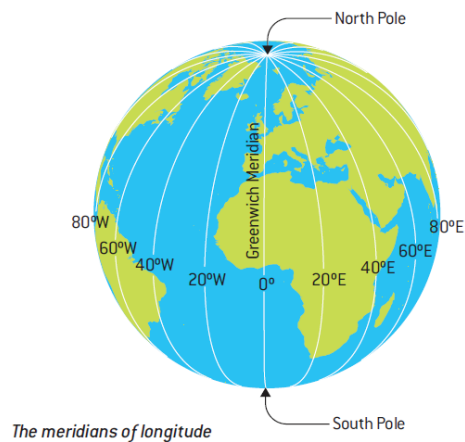
Mauusa: Look at the lines running from north to south on the globe.

Aruna: They look like lines on a pumpkin.

Arvind: And also, like how a vendor cuts the pumpkin or the water melon.

Mauusa: Good comparisons. These longitudes, unlike the latitudes all are of the same length. They divide the earth into the eastern and the western parts. These also help us understand the movement of the earth relative to the sun and the time in different parts of the world. I will tell you more about these later.





Longitudes

Grids are formed when a latitude and a longitude meet. These help us to locate a place on the globe. These are read by the satellites that we have sent into the space. The time stamp camera that helps us know the location of a place, the maps that the apps give us to know the location are all based on such grids.

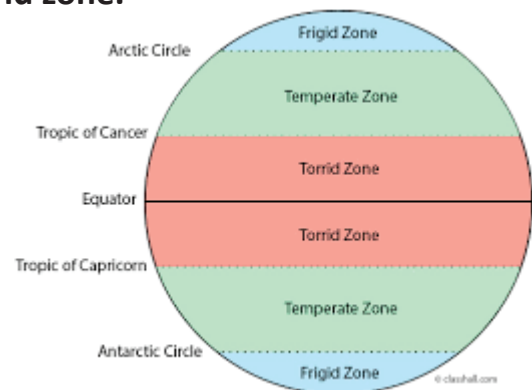
Aruna: That is interesting mauusa. What are the other benefits of these markings on the Earth?

Mauusa: We also understand the climatic conditions of a place, from the latitudes.

Climate is the general weather condition of a place. For example, the region from the equator to the Tropic of Cancer and Tropic of Capricorn is where the sun's rays fall directly for most part of the year. This region has a warm climate throughout the year. The temperature never falls below a certain range in this area. This region is known as the **torrid zone**.

The region above the Tropic of Cancer and below the Tropic of Capricorn till the polar region is known as the **temperate zone**. These places do not have extremely hot summers or very cold winters.

The regions above the temperate zone in the northern hemisphere and below it in the southern hemisphere are known as the **frigid zones**. The temperature here is extremely cold, even during summers. The summers here are colder than the winters in the equatorial or the torrid zones.



Arvind: Now I understood what temperature zones are. I know that they are also classified as the frigid zone, temperate zone and the torrid zone.

Aruna: But what are continents mauusa?

Mauusa: Look at the globe again. We see large land masses. These large land masses are known as **continents**. Asia, Europe, Africa, North America, South America, Antarctica and Australia are the continents.



Australia and Antarctica are the two continents that lie completely in southern hemisphere.



Do you know that when it is summer in northern hemisphere, it is winter in southern hemisphere and vice-versa? Can you name the country that celebrates Christmas in summer?

Arvind: Christmas in summer? It is winter during Christmas mauusa.

Mauusa: Countries in southern hemisphere experience summer when it is winter in northern hemisphere, as I told you. So, countries that are in the southern hemisphere celebrate Christmas in summer. Australia is the continent that experiences summer during Christmas.

Aruna: So interesting mauusa. If huge land masses are called continents, what are the large water bodies called?

Mauusa: A very pertinent question. Most of the earth is covered with water. That is why the earth appears blue, when we look at it from the space. The large water bodies that generally separate continents are called **oceans**. The oceans are Arctic ocean, Antarctic ocean, Atlantic ocean, Pacific ocean and the Indian ocean. The largest of these is the Pacific ocean. The only ocean to be named after a country is the Indian ocean.

Arvind: That was very interesting mauusa. You gave us a lot of information. I have to complete my homework now. Shall I work on it mauusa?

Aruna: I too want to.

Mauusa: Carry on with your work. We shall discuss something more during the weekend.



SUMMARY

- The earth's crust is made of plates called the tectonic plates. These plates at times collide with each other thereby creating friction which releases seismic waves resulting in an earthquake.
- After a strong earthquake the tectonic plates readjust themselves with smaller movements called aftershocks.
- Earthquake is a natural disaster like the cyclone, forest fire, hurricane etc.
- The government has a well-trained National Disaster Response Force (NDRF), to swing into action in case of a crisis.
- Maps that depict the physical features like the mountains, valleys, plains, etc. are known as relief maps and Maps that show how the world has been divided into countries and countries into states are known as political maps.
- The earth rotates on its axis. The earth is actually tilted at an angle which is known as the axis of the globe.
- The movement of the Earth on its own axis is known as rotation. The Earth takes 24 hours to complete one rotation. The rotation of the Earth causes day and nights.
- The movement of the Earth around the Sun in an elliptical orbit is known as revolution. The Earth takes $365 \frac{1}{4}$ (one year) to complete one revolution. The revolution of the Earth causes seasons.
- Latitudes are imaginary lines that run across the earth from east to west. Longitudes are imaginary lines that run from north to south.
- The longest latitude is called the equator. Equator divides the earth into two equal parts, the northern and the southern hemisphere.
- The latitude, that is at $23 \frac{1}{2}$ degrees north, is called the Tropic of Cancer. The latitude that is at $23 \frac{1}{2}$ degrees south is called the Tropic of Capricorn.
- Grids are formed when a latitude and a longitude meet. These help us to locate a place on the globe.
- Climate is the general weather condition of a place.
- The region from the equator to the Tropic of Cancer and Tropic of Capricorn is known as the torrid zone. The region above the Tropic of Cancer and below the Tropic of Capricorn till the polar region is known as the temperate zone. The regions above the temperate zone in the northern hemisphere and below it in the southern hemisphere are known as the frigid zones.
- Large land masses of the Earth are known as continents and the large water bodies that generally separate continents are called oceans.





I. Fill In the Blanks:

1. The earth's crust is made of plates called the_____.
2. Intensity of the Earthquake is measured in _____ scale.
3. The place where the intensity of the earthquake is maximum is known as _____.
4. These smaller movements after an earthquake is called _____.
5. Our government has a well-trained_____, to help help people when there is a disaster.
6. Maps that depict the physical features like the mountains, valleys, plains, are known as_____ maps.
7. The _____ is a model of the earth.
8. The movement of the Earth on its own axis is known as _____.
9. The revolution of the earth around the sun causes changes in_____.
- 10.The longest latitude is called the_____.
- 11.The latitude, that is at 23 1/2 degrees north, is called the_____.
- 12.The large land masses are known as_____.

II. Choose the correct answer

1. The Frigid Zone lies near the
a) Poles b) Equator c) Tropic of cancer d) Tropic of Capricorn
2. Grid is a network of
a) Latitudes and Longitudes
b) The tropic of Cancer and The tropic of Capricorn
c) The North Pole and the South Pole
d) The Arctic Circle and Antarctic Circle
3. Maps are made by
a) engineers b) teachers c) architects d) cartographers



4. Maps that show how the world has been divided into countries
 - a) Political Map
 - b) relief map
 - c) Physical maps
 - d) Topographic maps
5. Days and nights are cause due to
 - a) Rotation of Earth
 - b) Revolution of the Earth
 - c) Rolling of the Earth
 - d) None of the above
6. Imaginary lines that run from north to south.
 - a) Latitude
 - b) Longitude
 - c) Equator
 - d) Grid
7. Places that do not have extreme summers or winters
 - a) Torrid zone
 - b) Frigid Zone
 - c) Temperate Zone
 - d) Poles
8. The largest ocean
 - a) Arctic ocean
 - b) Antarctic ocean
 - c) Atlantic ocean
 - d) Pacific ocean
9. The time stamp camera that helps us know the location of a place is based on
 - a) Latitude
 - b) Longitude
 - c) Equator
 - d) Grid
10. The continent that experiences summer during Christmas.
 - a) Europe
 - b) Africa
 - c) North America
 - d) Australia

III. Unscramble the words

QKEAUEHTAR

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VOTILUREON

R										
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GIIRDF

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S					
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IV. Name the following:

1. The minor shakes that follow an earthquake.
2. The longest latitude.



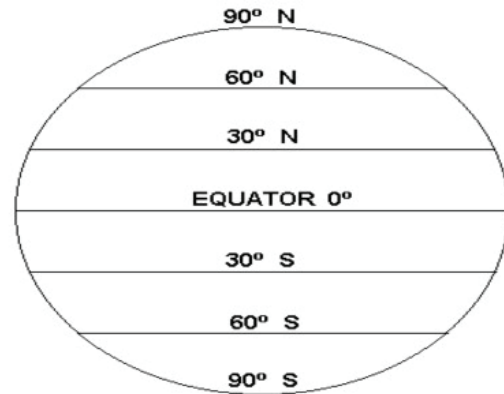
- The Earth's crust is made of these plates.
- The fixed path in which planets move.
- This movement of the Earth causes day and night.
- The latitude that is at 23 1/2 degrees south.
- The general weather condition of a place.
- The large water bodies that generally separate continents

V. Match the following:

1.	Torrid Zone	The region from the equator to the Tropic of Cancer and Tropic of Capricorn.	
2.	Temperate Zone	The latitude, that is at 23 1/2 degrees north.	
3.	Frigid Zone	The region above the Tropic of Cancer and below the Tropic of Capricorn till the polar region.	
4.	Equator	The latitude that is at 23 1/2 degrees south.	
5.	Tropic of Cancer	The regions above the temperate zone in the northern hemisphere and below it in the southern hemisphere.	
6.	Tropic of Capricorn	The longest latitude.	

VI. Mark the following in the given diagram

- Arctic Circle
- Tropic of Cancer
- Tropic of Capricorn
- Antarctic Circle
- Temperate Zone
- Torrid Zone
- Frigid Zone



VII. Answer the Following:

- How are earthquakes caused?
- What is a map? How is it useful?
- What is a Globe?
- Why does the Torrid Zone receive the maximum amount of heat?
- Differentiate between a political map and a relief map.
- Explain the terms a) Rotation b) Revolution.
- What is an Atlas?



8. What is epicentre?
9. Name a few natural disasters.
10. What are the Dos and Don'ts during an Earthquake

VIII. Activity:

Collect pictures of, the effect of a few recent natural calamities. Write a short note about each.

IX. Map work:

1. On the political map of the world, mark the continents and oceans
2. Mark the major latitudes





Channelise Your Energy

11



Expected Learning Outcomes

Students...

recollect photosynthesis - the process of food preparation by plants

know about the ultimate source of energy, the conversion of energy in a television, iron box and car, **that** all living organisms ultimately depend on plants for food, energy can neither be created nor be destroyed

know the meaning of energy, work, law of conservation of energy, force, frictional force, gravitational force

know why an object that goes up comes down naturally

understand the process by which hydroelectric power is generated, **how** the speed of a moving object can be controlled by frictional force

enumerate the advantages and disadvantages of frictional force



In this bag

Always Remember to see...

The different types of energy

Mechanical moves.

Electrical lights.

Sound is different: for you can hear without sight

Last, but not least, thermal is here too.

This one is unique because it heats you.

Each one is important,

Remember to see.

Everywhere you look is energy.

Never created,

Nor destroyed, just transferred from one to another.

All move,

Some fast, some slow.

Each one unique, but they all flow.

Remember to see...

Everywhere you look is ENERGY!!!!

– Anonymous



Raj was busy watching a football match. He was excited to see the ball moving between the centre forward and the goal keeper. He was fascinated by how the ball gained momentum and moved from right field to mid-field and the lightning speed at which the players were moving. He was inspired by the energy that the players had and the force with which they hit the ball.



Football

The next day he starts a conversation during coaching time with his seniors to know more about how the ball can be maneuvered. He understands how the players apply force to change the direction of the ball and also to slow down the ball. He gets very intrigued about how force can reduce the speed of a moving object. Luckily for him, the topic of discussion in the EVS class next day was Work, Force and Energy. He decides to get his doubts clarified then.

Acharya enters the class room.

Children: Namaste acharya.

Acharya: Namaste all. Please be seated.

Acharya: This evening we have the inter school basketball match scheduled. Do you know that our team has reached the finals? How many of you are planning to stay back after school to watch the match?



Some students raise their hand, while others say that they have their regular schedules to follow.

Acharya: I am happy that you are able to decide on what you want to do in the evening.

Karan: Acharya. I overheard some players discussing various strategies to win today's match. The coach then suggested that they save energy for playing the match in the evening. What did he mean by it acharya?

Acharya: Energy is required to play. If the players spend their energy for other activities, they would feel tired during the match. But what is energy?

Children: We need energy to work, play, go to our classes and a lot of other things.

Acharya: We can say that energy is the capacity to do work.

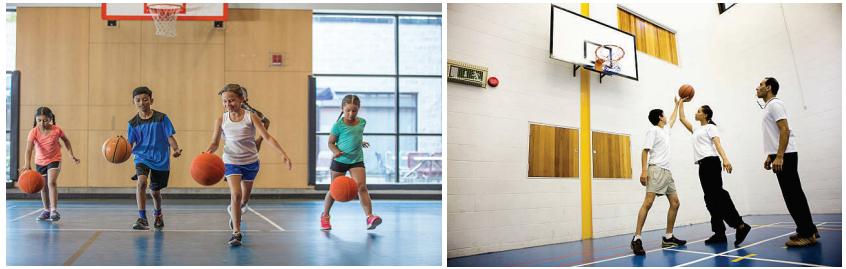
Yug: But players are not working acharya. They are going to play happily.

Acharya: That is a good thought worth pondering. Now let us look at what work is. What do you observe in the basketball court, when the match is on?

Anand: The players move all over the court, they dribble the ball and try to basket it. When they basket, they score a point. It's very interesting. My mother who was



a basketball player says that this is a high energy sport because the players have to be on the move, the entire duration of the game.



Basketball

Acharya: You have a good knowledge of this sport.

“The players have to be on the move”. Work is done when something moves from one place to another. Now do you understand what energy and work are? Energy is the ability to do work. Work is done when something moves.

Karan: I have a doubt. My brother in class XII works a lot when examinations are round the corner. He does not get up even for a sip of water. So, can I say that he is not working because he is not moving?

Acharya: You are right Karan. In science, work is said to be done only when there is a displacement, that is when an object moves from one place to another. You may use all your energy to push the wall. Would the wall move?

Kapil: No acharya.

Acharya: So work is not done. Work is done only when an object is displaced on application of a force. Since the wall has not moved work is not done.

Acharya: But you all do know that plants prepare food with the help of energy of the sun. Don't you?

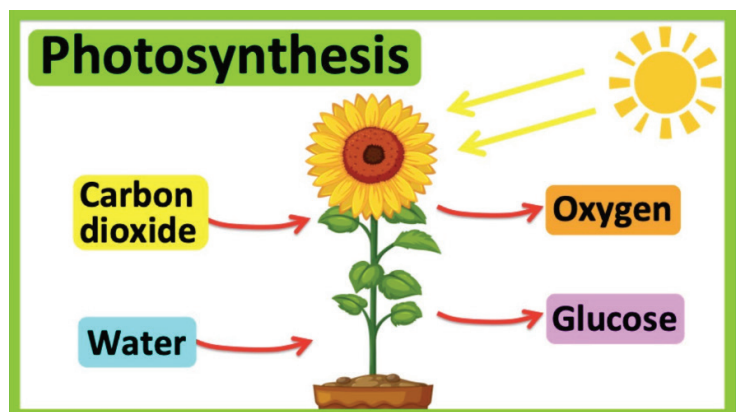
Chander: Energy from the sun? Plants prepare food using sunlight. Is light a form of energy acharya?

Acharya: Yes. Light is a form of energy. Plants utilize the sun's light energy and with the help of chlorophyll in the leaves and carbon dioxide in the atmosphere, they prepare food. Are you able to recollect the name of the process?

Dev: It is photosynthesis.

Acharya: Good. So, the light energy of the sun is converted into chemical energy.

Dev: Chemical energy?



Acharya: Yes. Plants use the light energy from the sun and prepare carbohydrates. Plants store the excess food that they prepare in different parts of their body. We eat those parts of the plant in which food is stored. The food prepared by the plants is thus a chemical that provides us energy.

Fadendra: That's interesting. When we eat the food, we get energy to work, play and do all other activities.

Acharya: The digested food is converted to energy by the process of respiration, which in turn is used by us as muscular energy to do work.

Guha: We use muscular energy to write, play, dance, etc.



Enrichment

Kinetic energy is the energy possessed by moving objects.

Acharya: The muscular energy that is used becomes the kinetic energy of the object that we move. Kinetic energy is the energy in moving objects.

Hari: So, energy keeps changing its form acharya?

Acharya: You have understood the point. Energy can neither be created nor be destroyed. It only keeps changing form. This is known as the **law of conservation of energy**.

Indu: Is this true in all applications acharya?

Acharya: Yes, it is. For example, in the case of television, the electrical energy is converted to light and sound energy, in an iron box, electrical energy is converted into heat energy, in case of petrol in cars, the chemical energy is converted into heat energy, which is then converted to kinetic energy of the car.

Jaya: That is so very interesting acharya. But what is the first source of energy?.

Acharya: The ultimate source of energy is the Sun. All forms of energy that we know are in some way or the other obtained from the Sun.

Lalita: But what about electric energy?

Acharya: Let us look at generation of hydroelectric power. You all know that dams store water, at a height. Thus, the water stored in dams possess potential energy. When this water flows down, the potential energy is converted into kinetic energy. This energy is used to rotate a turbine. The kinetic energy of the turbine is then converted into electrical energy. Let us recollect various sources of fresh water.



Hydroelectric Power plant



Enrichment

Potential energy is the energy possessed by an object, when it is raised from the ground.



Anubhav: Rivers, lakes, glaciers, rain.....

Acharya: Let us look at rivers and glaciers.

Rivers receive water from rain or melting glaciers. Both the processes occur because of the heat of the sun. Please recollect the water cycle. Thus energy from the Sun is required for this process too.

Mano: Oh. That's interesting acharya.

Nishant: I thought I always apply force to move an object. But now you tell us we use energy. It is quite confusing.

Acharya: Will you all agree that we use energy to push or pull an object?

Varun: Yes Acharya.

Acharya: Force is the push or a pull on an object.

Karan: In the football field yesterday, I saw force change the direction of the ball acharya!

Acharya: You are right. Force can change the direction of a moving object. Do you know that force can also change the shape of an object. Nowadays, we have squeeze balls for exercising our fingers. When we apply a force on the ball it changes its shape. It regains its shape when force is removed.

Omesh: Yes acharya, can force stop the motion of an object?

Acharya: Definitely, what does a cricket player do when he wants to catch a ball or stop a four? He applies force in the direction opposite to direction of motion of the ball, to stop it.

Priya: Oh... now it makes sense to me. So, when a bowler bowls, the ball which is at rest is set in motion. When the batsman hits, it changes its direction and speed. A fielder stops the motion of the ball. But sometimes the ball stops on its own, when it rolls on the ground.



Enrichment

The **Tehri Dam** plant in Uttarakhand is the largest hydroelectric power plant in India.

ACTIVITY

Can you name any two forms of energy that is not mentioned in this text?



Enrichment

Force is a push or pull that can

- a) move a stationary object
- b) stop a moving object
- c) change the speed or direction of a moving object
- d) change the shape of an object

Acharya: I appreciate your thought. When a ball rolls on the ground, it stops at some point of time, due to frictional force. A frictional force always opposes motion.

Quishi: Frictional force! My dad once told me friction has to be reduced as it results in loss of energy.



Acharya: Yes. The force of friction hinders motion and we need to apply more energy to overcome the frictional force to help the object move. But frictional force is not always bad. When we ride a two-wheeler, we may skid, if we move over an oil spill or sand on the road. Can you tell me why this happens?

Students look at each other. But are unable to answer.

Acharya: This happens because, there is a reduction of frictional force there. What happens when we walk on a wet floor?

Savitha: We skid. Now I understand why. This is because the frictional force between our feet and the wet floor is less.

ACTIVITY

List out a few activities that you can do to conserve energy.

Acharya: You have understood it right. In fact, we are able to walk on the floor easily, because of the frictional force between our foot and the ground. We are able to write on the black board or on the paper because of the frictional force between the chalk and blackboard and pen and the paper, respectively.

Tina: Acharya, yesterday I happened to know during the science club activity that unlike the muscular force, that can pull or push, there is a force that only pulls and doesn't push.

Acharya: You heard it right, Tina. This force is called the gravitational force. The earth exerts a force called gravity on all the objects. This force of gravity only pulls or attracts all objects towards itself. So, any object that is thrown upwards comes down naturally due to the gravitational pull.

Udaya: Thank God. The shuttle cock and the cricket ball that we throw up comes down on its own. My mother would not buy a new one every day.

The school bell rings indicating the end of the class

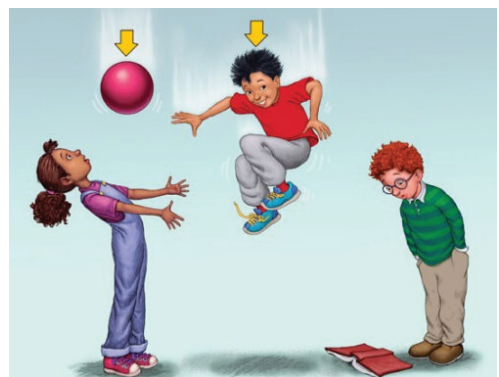
Acharya: We shall discuss on how to make work easier in the next class.

Children: Namaste and thank you acharya.

ACTIVITY

Find out the conversion of energy in the following

- 1) Toaster
- 2) Washing machine
- 3) Television



SUMMARY

- Energy is the capacity to do work.
- Work is done when an object undergoes displacement.
- The ultimate source of energy is the Sun. Plants utilize the sun's light energy and with the help of chlorophyll in the leaves and carbon dioxide in the atmosphere, they prepare food where, the light energy of the sun is converted into chemical energy.
- When we eat the food, we get energy to work, play and do all other activities. The digested food is converted to energy by the process of respiration, which in turn is used by us as muscular energy to do work.
- The energy of moving objects is called kinetic energy. The energy possessed by a body due to its position is called potential energy.
- The water stored in dams possess potential energy. When this water flows down, the potential energy is converted into kinetic energy. This energy is used to rotate a turbine. The kinetic energy of the turbine is then converted into electrical energy.
- Energy can be converted from one form to another.
- Force is the push or a pull on an object that can move a stationary object; stop or change the direction of a moving object.
- Frictional force opposes movement. It can be useful when we walk, write on a black board.
- The earth exerts a force called gravity on all the objects. This force of gravity only pulls or attracts all objects towards itself.



I. Fill in the blanks

1. Energy is the ability to do _____.
2. Work is said to be done only when there is _____.
3. The ultimate source of energy is the _____.
4. Force can _____ the direction of moving objects.
5. Power generated from flowing water is _____.
6. In humans, the digested food is converted into energy by the process of _____.
7. Energy stored in an object due to its position is called _____.



8. During photosynthesis _____ energy is converted into _____ energy.
9. Water stored in dams possess _____ energy.
10. A frictional force always _____ motion

II. Correct the sentences if they are not true

1. Energy can be converted from one form to another.
2. Potential energy is the energy possessed by a body due to its motion.
3. The frictional force is less on a wet floor than the dry floor.
4. In science, work is done only when an object is displaced.

III. Complete the following

S. No	Equipment	Conversion of energy	
		From	To
1	Geyser		
2	Fan		
3	Induction Stove		
4	Speaker		
5	Torch		

IV Match the following

1.	Potential Energy	Rolling ball	
2.	Light energy	Battery	
3.	Kinetic Energy	Charging phone	
4.	Electrical Energy	Water stored in dams	
5.	Chemical Energy	Sunlight	

V. Identify the different types of energy transformation in each of the pictures. Use the help box.

Mechanical Electrical wind heat sound chemical



1) Windmill: energy to Electrical energy





2) **Flashlight:** Electrical energy to



3) **Microwave:** energy to heat energy



4) **Firecracker:** Chemical energy to



5) **Bicycle:** energy to Kinetic energy



6) **Battery:** energy to Electrical energy

VI. Answer the following

1. Define
 - (a) Energy
 - (b) Force
 - (c) Motion
 - (d) Gravitational force
2. State the law of conservation of energy.
3. How do plants prepare their food?
4. Differentiate potential energy from kinetic energy.
5. Why is oil used in the engine of vehicles?
6. What will happen if there is no gravitational force on earth?



VII. Proposed Activity

Latha and Ramu are so fascinated by the facts that they have learnt about the frictional force, that they want to list down its advantages and disadvantages. You can also try to prepare a list. Also, explore ways by which friction can be reduced.

Advantages	Disadvantages





Survival of the Fittest

12



Expected Learning Outcomes

Students...

know what aerial animals, marsupials are

Know the meaning of poaching, adaptation in animals, habitat

understand why the characteristics of arboreal and aerial animals, bat is a mammal and not a bird, some animals aestivate/hibernate, climatic conditions vary in different parts of the world, **how** marsupials nurture their young ones, **the importance of** adaptation in birds and animals, the features of birds that help it fly, the **relation** between the feet of birds and their habitat, food habits

analyse the difference between climate and weather, endangered and extinct species

appreciate the importance of national parks in preserving flora and fauna



Have you ever seen fish block traffic? It is a common sight in Seattle, Washington (United States of America). Every year, around mid-November, schools of Salmon fish cross the road to travel from the Pacific Ocean to the river that they were born in, to lay their eggs. Traffic is stopped for a while for the fish to cross the road. The rivers get flooded due to rains and the roads are covered with water which helps the fish to cross without difficulty. Salmon fish survive in both fresh and salt water.



Salmon crossing the road



Scan QR code to watch
Salmon crossing



Rishita's father Mr. Ram Teke has been transferred to Thiruvananthapuram from Mumbai. The family had decided to stay in Munnar, a hill station in the state of Kerala before Rishita joins school at Thiruvananthapuram, the state capital. Mr. Ram Teke's family and Mr. Gopakumar's family are good friends. So both the families decide to spend time together, at Munnar.

Rishita: Ai (mother in Marathi), it's a good idea to meet my friends Omana and Unni before I go to school because I am a little apprehensive about the new place and the language that I don't know.

Rama (Rishita's mother): Yes Rishita. Relax and enjoy the company of friends.

Ram Teke: You have to also adjust to the new food that we may have to eat frequently. From now on we would be eating dishes made of rice more than wheat.

Rishita: Vadila (father in Marathi), I have learnt in my EVS that rice is the staple food of people in the southern part of our country and Kerala is one of the five southern states. So they consume more rice.

Ram Teke: Yes Rishita. I love their puttu and kadalai curry. It is a delicious and a wholesome breakfast. Puttu is laden with carbohydrates and provides energy and the kadalai is rich in proteins and minerals. It is a good nourishing meal.

Rishita: Ai! I have also learnt that Kerala receives a lot of rainfall and is humid for most part of the year.

Rama: Kerala enjoys three major seasons, summer, monsoon and winter. They enjoy the south-west monsoon from June to August and the north-east monsoon from October-November. Summer in Kerala is from March to May and winter from November to February.

The family arrives at Munnar the following day. They are received at the station by Omana's father, Mr. Gopakumar. They freshen up and have the traditional breakfast of Kerala.

Omana, Unni and Rishita and their parents go out to enjoy the pleasant weather. The sun appears bright and shining.



Idiyappam & vegetable stew

Rama: It's a weather, for a picnic, neither too hot, nor too cold and it is not raining either. The place is picturesque too.

Gopakumar: The climate is pleasant for most part of the year here though we have three seasons. The winter becomes colder that we need warm clothes during that season. We also prefer to stay indoors during winter.

Rishita: Would we enjoy such pleasant weather in Thiruvananthapuram, ai?



Rama: How I wish you would be able to! Thiruvananthapuram does not get very cold during any part of the year, that way there are no extreme temperatures. But, It has high humidity almost throughout the year. So you sweat for most part of the year.

Rishita: What is humidity ai?

Rama: Humidity is the amount of water vapour that is present in the atmosphere. We start sweating when temperature increases. When sweat evaporates it takes heat from our body keeping us cool. When the humidity is high, evaporation is less, so we feel the heat, sweat also runs down our face and body making us feel uncomfortable.

Unni: Why is Thiruvananthapuram humid?

Gopakumar: Arabian Sea is the western boundary for Thiruvananthapuram. Places near the sea coast are very humid because there is continuous evaporation of water from the sea. Since humidity is high, our sweat does not evaporate easily. Thus we feel very uncomfortable. However, the climate in coastal areas is moderate (i.e.) it never becomes too hot or too cold. Cities like Chennai (Tamil Nadu), Mumbai (Maharashtra), Puri (Odisha), Dandi (Gujarat) are a few coastal cities in India.

Rishita: What makes Munnar a cooler place?

Ram Teke: Munnar is a hill station i.e., it is at a higher altitude. It is about 1600 metres above the sea level. Places that are above mean sea level have a cool climate depending on the height at which they are from the sea level.



Munnar



Enrichment

When we sweat more, we need to drink plenty of water to replace the lost fluids

When sweat evaporates it takes heat from our body for the process, thus keeping our body cool.



Kargil heroes



Enrichment

Kargil and Leh are the two districts in Ladakh region. It has a number of heritage sites, ancient rock carvings and war memorials.

Ladakh is also called the "cold desert" as it receives negligible rainfall and has sparse vegetation.



Unni: Yes. I remember my teacher talking about the Kargil war heroes. She told us that the battlefield was about 20,000 feet above the sea level and our soldiers fought bravely even under such extreme cold weather conditions and protected the dignity of our motherland, Bharat. I wish I become a soldier one day.

Omana: I am proud that you know so much. I know that Kargil Vijay Diwas is on 26th July every year. We remember our war heroes and also pledge to uphold the dignity of our nation.

As they walk along it starts raining.

Rishita: Ai! It was bright and sunny so long and suddenly it has started raining. How did the climate change so quickly?

Rama: It is the weather that has changed so quickly. Climate does not change as quickly as the weather. Climate is the long time weather condition of an area.

Rishita: Is it so? I thought climate and weather are the same. Tell me a little more ai.

Rama: Weather can vary in a very short span of time. Sometimes within an hour too. It was just now sunny and now it is raining. It might become warm again. It would become cooler at night.

Omana: I understand now. The long term weather pattern in an area is known as its climate. Like what you said earlier Thiruvananthapuram is humid and does not experience extreme temperatures.

Rama: That’s an excellent way to understand Omana. You have got it right.

Short term daily changes	Weather	Sunny
		Rainy
		Windy
The part of the year normally characterised by a particular weather	Seasons	Summer
		Monsoon
		Winter
Relatively stable weather condition of a place	Climate	Tropical
		Temperate
		Torrid
		Frigid

Rishita: But we wear clothes according to the weather and we also go to different places depending on what the season is. But, don’t animals feel uncomfortable when seasons change? How do they manage them?

Rama: I was expecting this question. We will discuss this as we walk through the place.



As they keep walking they move closer to a water body where they see a lot of aquatic birds.



Enrichment

Birds that live in water are aquatic birds

Rishita: It's such a beautiful place. I love it. How nice to see the duck swimming in water.



Webbed feet

Oars of a boat

Rama: Good you enjoy that. Look at the duck that is near the edge of the lake. Take a closer look at its feet.

Rishita: Its feet look different. It has a thin skin connecting their toes.

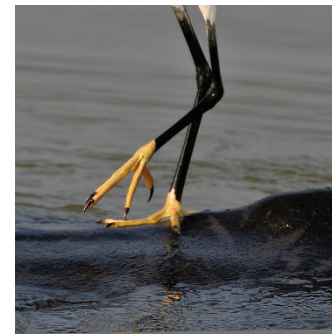
Rama: Good Rishita. Ducks have webbed feet. The webbed feet help them to paddle through water.

Observe them closely. They are like the oars of a boat. Such birds are called **Swimming birds**. Ducks, geese, pelicans are a few birds that have webbed feet.

Rishita: I also see some birds with long legs in water.

Rama: They are called **Wading birds**. Their long legs help them wade through water. They wade through shallow water in search of food.

Unni: I have a doubt. I play in rainwater making paper boats. They don't float once they become wet. How do these birds keep swimming in water always? They also flutter their wings on and off and splash water around, some of it on them also.



Feet of a wading bird

Rama: That's a good connection to make. Most of the birds are water proof. They have oil glands on them that keep water away. Thus, the water does not stick to their body and they remain light always.

Omana: That's very interesting. I have also learnt in class IV that birds have hollow bones and hence are light. This also enables them to fly.

Unni: I understood that ducks and geese have webbed feet and their toes are attached by skin, to help them swim in water. How are the feet and toes of other birds?

Rama: All birds have two feet. Each foot has four toes with a claw at the end. Three toes point forward and one points backward.

Birds like sparrows, crows perch on trees. Their toes can move independent of each other to get a better grip. Such birds are called **Perching Birds**.

Birds like woodpeckers and parrots that climb on trees, have two toes forward and two backward. This helps the birds to have a firm grip on the trees. Such birds are called **Climbing birds**.



Hawks, owls and eagles are predatory birds. They have sharp and powerful claws called talons. They have three talons pointing forward and one pointing backward. This helps them to have a strong grip over their prey and carry them to other places and to their nest. Such birds are called birds of prey or **Preying birds**.

Feet of



Perching birds



Climbing birds

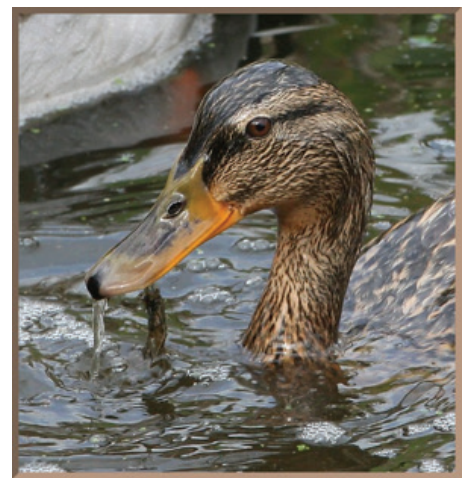


Preying birds

The beaks and claws of birds vary depending on the food they eat and the environment in which they live.

Omana: The ducks seem to be having a beak that is different from the beaks of other birds.

Rama: They have wide and flat beaks. Observe how they feed themselves. They take in their food with water and other substances. The strainers in their beak strain off the water and dirt and they consume only the fish.



Strainers in the beak of a duck

It is a sight to watch a bird fly. I have read that the Wright brothers invented the aeroplane, inspired by the flight of birds. What are the features that actually help a bird to be in air?

Guard: Birds have hollow bones or in other words, their bones are filled with air. So they are light. Their forelimbs (hands) are modified into wings. They have strong wings. They also have flight feathers, down feathers and tail feathers.



Flight feathers



Down feather



Tail feathers

Suchitra: Wow, three kinds of feathers! How do they help them?



Guard: The flight feathers as the name indicates, help them fly. The tail feathers help them to change the direction of flight and the down feathers keep them warm. Also, look at their body. Their body is streamlined.

The streamlined body helps the birds to steer through air. The body of aeroplanes and cars are also streamlined, to help us steer them through air. Added to these, birds also have oil glands on their body that prevent them from getting wet. So, they do not soak in water and become heavy.



Streamlined body of birds

Suchitra: Now I understand why my value education teacher keeps telling that God's creations are marvellous. You said that their down feathers keep them warm. Do mammals have something to keep them warm?

Rama: That's a very thoughtful question. The body of mammals is covered with hair. The thickness of it varies according to the region the animal lives in. They act as insulators to maintain a constant body temperature. Mammals living in cold regions have a thick layer of hair on their body. This is called fur.

As they walked on they came across a herd of goats which looked very different from the goats which they usually see in the cities.

Rishita: Oh! Those goats look so different from the goats that I have seen near my house.

Rama: These are Nilgiri Tahr. The southern part of the Western Ghats is their natural habitat. They feed on the grasslands on the steep rocky cliffs. They have strong thin legs to climb the cliffs with ease. Their special body features help them to survive in mountainous regions. These goats are now an endangered species.



Nilgiri Tahr – State animal of Tamil Nadu

Unni: I know that an endangered species is one that is facing a threat of extinction. How do animals become endangered?

Ram Teke: Loss of natural habitat and poaching are the two main reasons for this. Organisms are adapted to live in a particular habitat. When this habitat is lost, the number of the animals reduce drastically, which can also make them extinct.

Omana: But, what are we doing to prevent this achan (father in Malayalam)?



Enrichment

Poaching refers to the illegal hunting, capturing, or killing of wild animals.





Enrichment

A habitat is the home of an organism. A habitat meets all the environmental conditions an organism needs to survive

Gopakumar: Poaching is banned. The Government has also created national parks. Human activities are banned in national parks to protect the plants, animals and the culture of tribals who may be living there.

Rishita: Vadila, you said that animals are adapted to live in a particular habitat. What do you mean by it?

Ram Teke: There are some physical characteristics which organisms have gained over a period of time to live in a particular environment. Such features are called adaptations.

Rishita: Yes, I know, I have learnt that yaks have thick fur to protect them from cold weather.

Ram Teke: True. Animals living in higher altitudes are also adapted to live in thin atmosphere. They have more blood cells to take in oxygen from whatever is available.



Enrichment

A thin atmosphere simply means less air.

Gopakumar: Have you observed the fur colour of animals that live in snow covered mountains?

Omana: Yes achan. They are white. It helps them to camouflage with the snow that they live in.

Ram Teke: Very good. Some animals like arctic fox have a brown fur in summer, which turns white/grey in winter. If you observe them closely, they are also short and fat.



Summer and winter coat of arctic fox

Mountain Goat

Omana: Oh yes. Why is it so?

Gopakumar: They are short, so that the blood can circulate quickly to supply oxygen as there is less air in the upper reaches of atmosphere. They also have a thick layer of fat under their skin to protect them from cold weather.

Rishita: Do humans live in such harsh climatic conditions?

Rama: Eskimos live in the Arctic region. Eskimos, also called Inuits, are adapted to live in ice covered Arctic Regions, Greenland and Alaska. They are usually short and fat



people. They get their food by fishing and hunting reindeer, seal, walrus and whale. They use harpoons and spears for hunting. They travel in kayaks which are boats covered with animal skin. On land they travel on sledges pulled by dogs. They live in homes called igloos made from blocks of ice. In summer they live in tents made of animal skins.



An Eskimo

Ram Teke: Animals that live in cold regions go on a long winter sleep called hibernation, to conserve energy.

Rishita: Why should they do that?

Rama: When it gets very cold food becomes scarce. The animals would need a lot of energy, to move around. So to conserve energy animals like lizards, bears, bats and squirrels hibernate. The fat stored beneath their skin provides energy during this period.



Emperor Penguins

Omana: Penguins are birds that live in polar regions. Can they fly away to keep them warm?

Ram Teke (smiling): Penguins are flightless birds. Remember that a bird's body has to be light to help it fly. Penguins also have a thick layer of fat below their skin to keep them warm. They huddle together to keep each other warm, especially during winter.

Unni: Oh! That is wonderful. Now that I know how animals are able to survive in extreme cold climates. I would also like to know the adaptations of animals in deserts.

Rishita: I know about adaptations of camels that live in deserts. Camels have thick skin to protect from the heat of the sun and prevent loss of water. They have thick padded feet to walk easily on the hot sand. They have long eyelashes to protect the eyes, from sand during sand storms.

They can be without water and food for a long duration. Camels store fat in their hump to survive scarcity of food. When water is available, they drink plenty of water to make up for the lost water.

Omana: Achan, do you know about any other animals that live in the deserts?

Gopakumar: Desert animals like rattlesnakes, desert horned lizards have dry scales. These scales help them to grip the surface to crawl.

Rishita: How do animals in deserts combat the scarcity of food and water in extreme hot conditions?



Indian Camel





Enrichment

Kangaroo rats of the desert region survive almost without water. They depend entirely on the seeds that they eat. They sleep most part of the day underground and come out to feed at night when it is cooler

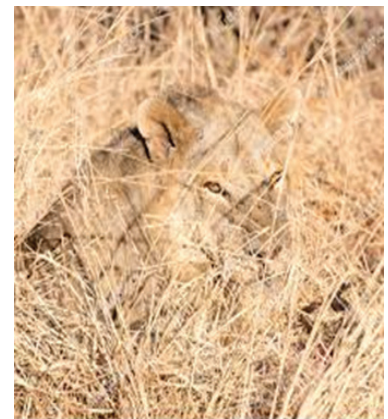


Ram Teke: Some of the desert animals bury themselves under the sand to escape from the extreme heat. To escape from scarcity of food during the hot season the animals sleep for long hours. This summer sleep of desert animals is called aestivation. Aestivation prevents excessive water loss and damage of internal organs that may arise due to high temperatures.

Rishita: What are the adaptations of animals in grasslands?

Unni: Grasslands have a wide variety of animal inhabitants. Their body colour is such that they can camouflage behind the bushes. Deer have long, strong legs that helps them to run away from predators. Their sense of hearing and smell is also very sharp, to enable them to sense the predators.

For carnivores like lions the colour of their body coat merges with dry grass. Their keen sense of smell, sharp eyesight help them to locate their prey. They are extremely agile to pursue them. Their strong claws and sharp teeth help them to tear their prey to feed on them.



Lion camouflaged in dry grass

While they were walking, they see a group of monkeys on the trees.

FACT FILE

Sloths spend close to 17 hours a day sleeping while hanging upside down on a tree branch. Sloth eats the leaves of the tree on which it lives. It moves to another tree when it has eaten enough leaves from that tree. Their life span is 40 years during which time they move around only 8 trees. Are you able to relate to what we mean when we say "Don't be Sloth"?



Sloth

Rama: Look at the monkeys on the trees. Animals like monkeys and squirrels that spend most of their time on trees are arboreal animals. They perform most of their activities like eating, sleeping and playing on tree canopies. They have strong limbs, strong toes and thumb to hold on to the branches of trees without falling. They also use their tail to balance when they swing from branch to branch. Chameleon, koalas, garden lizards, squirrels and sloths are a few arboreal animals.

Unni: I had also read in a book that koalas are marsupials.

Rishita: Marsupials! What does it mean?





Enrichment

Most of the marsupials are found in Australia, New Guinea and some parts of America.

Unni: They are mammals with a pouch. They give birth to premature young ones. The young ones stay inside the mother's pouch till they are completely developed. The mother moves around with the young ones in the pouch, caring and nursing the babies.

Rishita: Then, are kangaroos also marsupials? I have always admired the warmth and care a mother kangaroo renders to its babies. How tough it must be to hop around with babies in the pouch?

Unni: You are right. Motherly care and affection have no boundaries.



Kangaroo with its little one in its pouch



A Wombat with its offspring in its pouch

Omana: Cheta (elder brother in Malayalam), it was so nice to hear about the motherly care in animals also.

As they were walking, they heard the chirping of mynahs on trees.

Rishita: We can see birds also on trees. Are they also arboreal animals?

Unni: No. Birds spend most of their time in the air. So they are aerial animals.



Kite



Bats

Rishita: Bats can also fly. But my teacher told it is not a bird. Why?

Rama: Bat is a mammal. Mammals give birth to young ones, feed their young ones with their milk and have hair on their body. Birds on the other hand lay eggs, have feathers. Tell me whether the bat is a mammal or a bird?

Rishita: Bat is a mammal. This visit is really an edutainment. How much have I learnt about birds and animals! I wish I am able to study more about birds.



Enrichment

An ornithologist is one who studies birds and their behaviour. Dr. Salim Ali was India's first ornithologist



SUMMARY

- Rice is the staple food of people in the southern part of our country and Kerala is one of the five southern states.
- Kerala enjoys three major seasons, summer, monsoon and winter. They enjoy the south-west monsoon from June to August and the north-east monsoon from October-November. Summer in Kerala is from March to May and winter from November to February.
- Humidity is the amount of water vapour that is present in the atmosphere. Places near the sea coast are very humid because there is continuous evaporation of water from the sea. Since humidity is high, our sweat does not evaporate easily.
- Places that are above mean sea level have a cool climate depending on the height at which they are from the sea level.
- Kargil Vijay Divas is on 26th July every year. We remember our war heroes and also pledge to uphold the dignity of our nation.
- Weather can vary in a very short span of time and climate is the long time weather condition of an area.
- Birds are of different types such as swimming birds, Perching Birds, Climbing birds, Preying birds on the basis of their feet and claws.
- Birds have hollow bones filled with air. So they are light. Their forelimbs are modified into wings. They also have flight feathers, down feathers and tail feathers. The streamlined body helps the birds to steer through air.
- Nilgiri Tahr feed on the grasslands on the steep rocky cliffs. They have strong thin legs to climb the cliffs with ease to survive in mountainous regions. These goats are now an endangered species.
- Endangered species is one that is facing a threat of extinction. Loss of natural habitat and poaching are the two main reasons for extinction.
- Government has created national parks to protect the plants, animals and the culture of tribal who may be living there.
- Physical characteristics which organisms have gained over a period of time to live in a particular environment. Such features are called adaptations.
- Animals living in very cold regions are short, so that the blood can circulate quickly to supply oxygen as there is less air in the upper reaches of atmosphere. They also have a thick layer of fat under their skin to protect them from cold weather.
- Penguins are flightless birds. They also have a thick layer of fat below their skin to keep them warm. They huddle together to keep each other warm, especially during winter.



- Camels have thick skin to protect from the heat of the sun and prevent loss of water. They have thick padded feet to walk easily on the hot sand. They have long eyelashes to protect the eyes, from sand during sand storms.
- Desert animals like rattlesnakes, desert horned lizards have dry scales. These scales help them to grip the surface to crawl.
- Animals that live in cold regions go on a long winter sleep called hibernation, to conserve energy and summer sleep of desert animals is called aestivation. Aestivation prevents excessive water loss and damage of internal organs that may arise due to high temperatures.
- Grassland animals camouflage to hunt its prey. Arboreal animals like monkeys and squirrels spend most of their time on trees and marsupials like Kangaroo carry the young one in their pouch.
- Mammals give birth to young ones, feed their young ones with their milk and have hair on their body



I. Fill in the blanks

1. The staple food of people in the southern part of our country is _____.
2. Kerala experiences summer from from _____ and winter from _____.
3. Humidity is the amount of _____ that is present in the atmosphere.
4. Places near the sea coast are very _____ because there is continuous evaporation of water from the sea.
5. Climate is the long time _____ condition of an area.
6. The webbed feet of ducks help them to _____ through water.
7. Birds have _____ which help them fly.
8. The _____ body of birds helps the birds to steer through air.
9. The body of mammals is covered with _____ which act as insulators.
10. Endangered species are those that are facing a threat of _____.
11. Animals that live in cold regions go on a long winter sleep called _____.
12. The summer sleep of desert animals is called _____.



II. Name the following

1. An arboreal animal.
2. An animal that lives in a desert.
3. The state animal of Tamil Nadu.
4. An aerial animal.
5. The percentage of water vapour in the atmosphere.
6. Animals that keep their young ones inside their mother’s pouch.
7. Person who studies birds and their behavior.
8. Flightless bird.
9. The long weather pattern of an area
10. 26th of July

III. Observe the pattern and fill in

1. Nilgiri Tahr : Western ghats :: penguins : _____
2. Deer : grassland :: _____ : desert
3. Sloth : arboreal :: _____ : aerial
4. Ducks : webbed feet :: camels : _____
5. Polar bear : snow :: _____ : grassland
6. Bear: _____ :: desert tortoise : aestivation

IV. Give 2 examples for the following:

Perching birds	
Swimming birds	
Animals that camouflage	
Animals that hibernate	
Desert animals	
Marsupials	
Arboreal animals	



V. Match the following

1.	Swimming birds	Have sharp and powerful claws	
2.	Wading birds	Toes move independent of each other	
3.	Perching Birds	Have 2 toes forward and 2 backward	
4.	Climbing birds	Long legs to wade through water	
5.	Preying birds	Webbed feet to paddle through water	

VI. Write any three adaptations of the following

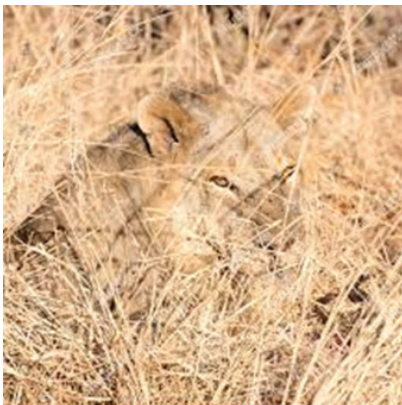
1.



2.



3.



VII. Answer the following

1. What are endangered animals?
2. How do feathers of the birds help them to fly?
3. Nilgiri Tahr can move on mountains with ease. How?
4. Define aestivation. Why do animals aestivate?
5. How does hibernation help some animals survive?
6. Differentiate weather from climate.
7. Animals living in very cold regions are short and fat. Explain this feature as an adaptation
8. Why are national parks important?
9. Write a short note on Eskimos
10. What are arboreal animals? How do arboreal adapt to their surroundings?

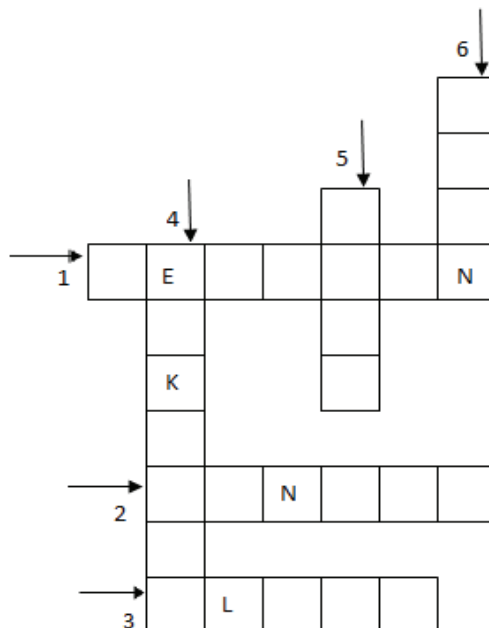
VIII. Complete the cross word with the clues given

Across :

1. A flightless bird that lives in the arctic region.
2. An animal with a long tail that spends most of the time in the tree canopies.
3. An animal that spends almost 17 hours of a day sleeping on the trees.

Down :

4. These people are also called as Inuits and live in the cold Arctic regions.
5. An aquatic bird
6. A carnivore with a body coat that camouflages with the dry grass. Often called as the king of forest.



IX. Art Integrated Activity

BEST OUT OF WASTE

1. Take a small plastic bottle and fill it with cotton roll or used newspapers.
2. Fix the cap vertically and make two eyes and a beak on it.
3. Waste x-ray sheet can be fitted to sides as flippers.

What animal did you get out of the above? Draw it.





Magic in space

13



Expected Learning Outcomes

Students...

know the first living being to go to space, human to travel to space, woman to go to space, humans to walk on the moon, Indian to travel to space, Indian satellite launched,

know the phases of the moon, the important launches by India to study the moon.

know what ISRO, NITI Aayog, payloads, telescope, eclipse, luminous and non-luminous body is, a spacecraft, a satellite mean

understand..... the importance of Mangalyaan-Mars Orbiter Mission (MOM), **that** we were once pioneers in astronomy

how the payloads for AzaadiSAT-2 were developed, shadows are formed, lunar and solar eclipses are formed

the purpose of Skylab launched by USA

understand the difference between luminous and non-luminous bodies, spacecraft and a satellite



Dr. Srimathy Kesan along with volunteer teachers and girl students from all over India, especially rural areas propelled the construction of the satellite AzaadiSAT-2. This satellite had the capacity to monitor temperatures and humidity of the earth.



Maya is excited about what she heard as news in the school assembly that day (11th February, 2023). She enters the house and excitedly shares the news with her mata (**mother in Bengali**).

Maya: Mata. I heard something today which inspired me.

Dadi (paternal grandmother in Bengali): What is that, Maya? I would be happy to listen to the reason for your excitement.

Maya: Yes dadi. Today I listened to the news that was read in the assembly. I came to know that, about 750 girl students from across our country developed payloads for India's AzaadiSAT-2. It was placed in the orbit by the Indian Space Research Organization (ISRO) on 10th February, 2023.

Dadu (paternal grandfather in Bengali): Good Maya. When you pay attention to what is happening in school, you gain a lot. To add on to what you heard, these girls were from rural areas and from the economically weaker sections of the society. A private organization made this possible with the help of NITI Aayog that helped them identify the schools and the students.

Dadi: Students were from places as far as Ganderbal in Kashmir, which is also a place where there are a lot of terrorist activities. Some areas were so remote that internet connections were a challenge. Some of the training sessions for the girls happened online and some happened offline.

The materials required were sent to the schools. The students learnt to assemble them with the support of their science teachers.

It was indeed a moment of joy, pride, satisfaction and hope for everyone when the first signals were received from the satellite 15 minutes from the time of its separation from the rocket.

Maya: Oh... I did not know that you followed the news so intricately. Tell me more dadi. I don't know what a payload is. I thought rockets and satellites are the same.

Dadi: Payloads are what the rockets carry. It can carry satellites, warheads, animals, human beings, etc. depending on the mission.



Enrichment

The Indian National Committee for Space Research (INCOSPAR) was established under the Department of Atomic Energy (DAE) in 1962. INCOSPAR was renamed Indian Space Research Organisation (ISRO) in 1969.



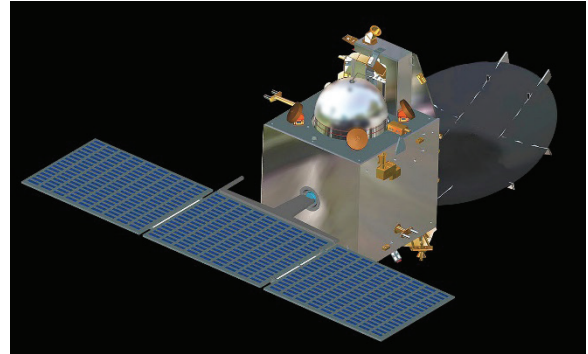
Enrichment

NITI Aayog or National Institution for Transforming India is a think tank that brings together central government, state government, and union territories, to plan and execute programmes for the development of the country.



Maya: That is quite interesting. I read that India now launches satellites for other countries also through its launch vehicle. My teacher also told us that we have developed technology so well that we are able to launch multiple payloads using a single launch vehicle, multiple times.

Dadi: Yes Maya. We have come a long way from where we were at the time of our independence. Our Mars Orbiter Mission (MOM), popularly known as Mangalyaan has made the world turn around and look at us. It was launched from Satish Dhawan Space Centre, in Sriharikota, Andhra Pradesh on 5th November 2013. Many saw it flying through the sky, while many more watched it take off on their television screens. It was indeed a proud moment for all of us! It was placed in orbit on 24th September, 2014. During the



Mangalyaan



Enrichment

An astronomical telescope helps us observe celestial bodies, while through a terrestrial telescope we can see places that are faraway on land.



process of its working, it has beamed us at least a thousand pictures of Mars, all of which are loaded with information. The MOM was predicted to have a life of six months but it continued to send significant scientific results on Mars till April, 2022 after which it lost communication with the ground station.

Dadu: India was the first among the Asian nations to launch this mission. We were the first nation in the world to make it successful, in the first attempt. It is indeed a great achievement for all of us especially the scientists, who worked in the project directly.

Maya: I am also happy and proud to know that. I always thought that we were not doing well in areas of science and technology.

Dadi: We were the pioneers in astronomy. We knew that the world was round and the planets went around the Sun and not vice-versa, long before the rest of the world thought about it. The almanac that we have been making for centuries gives us details about the celestial bodies and their positions in the sky, **accurately**. We were able to calculate these, even without instruments like the telescope, that are used now.



Enrichment

An almanac is a calendar published every year with astronomical information such as the daily time of sunset and sunrise, the phases of the moon, the transit of the moon, planets and the sun.



Ponder



Has any space craft been sent to Sun? Find out.

Maya: Is it so dadi? What are the details that an almanac gives us?

Dadu: I shall tell you a few.

The almanac gives us accurately the time of sunrise, moonrise, occurrence of full moon, new moon, eclipse

formation and the position of the other planets in space. Remember that the almanac has been in use since time immemorial. Can you imagine doing such precise calculations today, without computers?

Maya: That is amazing dadu. But what is an eclipse?

Dadi: An eclipse is a shadow cast by heavenly bodies on each other.

Maya: I have always observed that the shape and size of shadows keep changing. But I don't know how a shadow is formed?

Dadi: When do you see a shadow?

Maya: When the power goes off and mata lights a candle, I see a shadow. I have also seen a shadow of my hand, sometimes when I don't sit at the right place to read or write.

Dadi: Have you found out what the right place is?

Maya: I see shadows, when the path of light is blocked.

Dadi: Good. When an opaque body comes in the path of light, a shadow is formed. For example, if your hand comes between the light source and your notebook, you see the shadow of your hand on the notebook.

Maya: I understand now dadi.

Dadi: Can you tell me in which direction – east or west – you will see your shadow in the morning?

Maya: Yes dadi. My shadow would be in the west in the morning, when the sun is in the east. In the evening, it appears in the east as the sun is in the west. At noon, the shadow falls at my feet. So, am I right if I say that shadows are formed on the other side of the opaque object, that is opposite to the direction of the source of light.

Dadu: Good observation Maya. Before we go into the eclipses, let us understand a few points. Sun is the



Almanac

Think about...



Why do we need an astronomical and a terrestrial telescope?

Ponder



In which direction can you see your shadow in the morning?



luminous body that provides light. All planets including the Earth and satellites including the moon are non-luminous bodies.

Maya: What are luminous bodies dadu?

Dadu: Luminous bodies have their own light. The sun and the other stars are the luminous bodies that we see in the sky.

Maya: But the moon also gives us light?

Dadu: The moon only reflects the light of the sun. It does not have light of its own. When you place a candle or a lamp in front of a mirror, the mirror reflects, the light. In the same way, the moon only reflects the light of the sun. The moon is opaque and does not allow light to pass through.

Maya: That is interesting. Tell me about eclipses also dadu.

Dadu: Before we go into eclipses, we shall look at what full moon and new moon days are.



Full moon



Enrichment

Planets are heavenly bodies that move around the Sun.

Natural satellites are celestial bodies that move around planets. Some planets have no satellites while some have many.



A New moon with a diamond effect during a solar eclipse

Maya: I have read about the phases of the moon. A full moon occurs when we are able to see the face of the moon that is fully lit by the sun. This occurs once in 28 days.

On new moon days, the earth faces that side of the moon that does not receive sunlight. So, we do not see the moon on that day. This again occurs once in 28 days.

Dadu: Good, remember, we see that part of the moon that is illuminated by the Sun. On full moon days the earth is between the Sun and the Moon. But, on some full moon days, the Sun, Earth and the Moon are in a straight line such that the light from the sun does not reach the Moon because it is blocked by the Earth. What would happen then?



Phases of the Moon

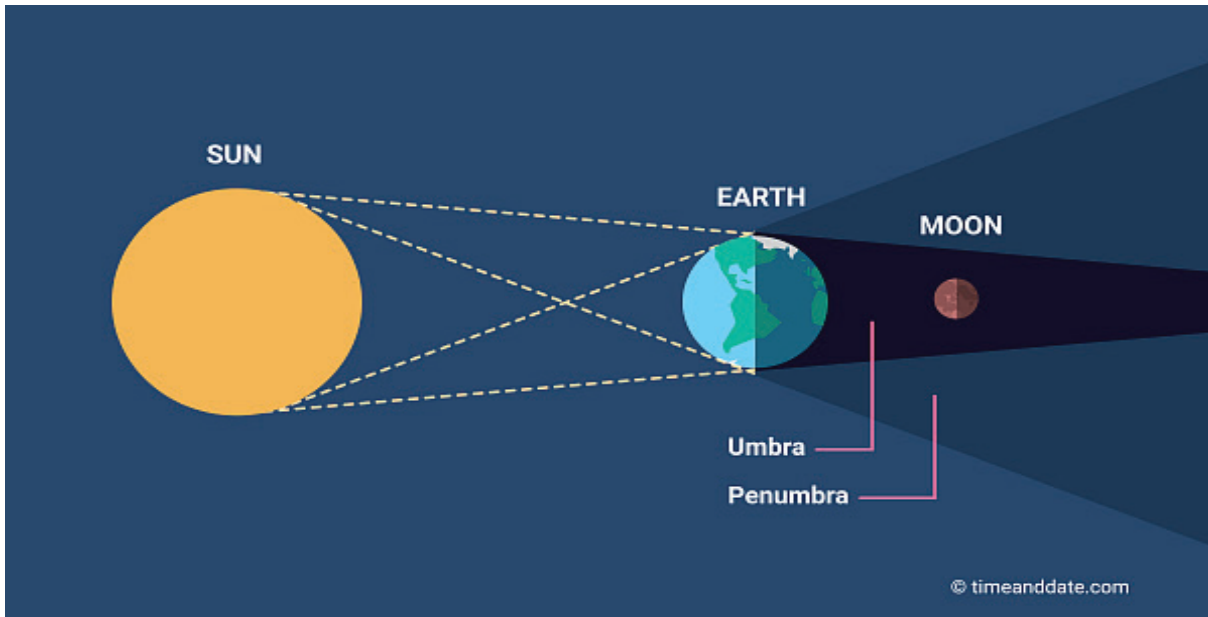


Maya: Earth being opaque will cast a shadow on the moon.

Dadu: If the earth's shadow is cast on the moon, can we see the moon?

Maya: We cannot, as the moon has to receive the sunlight, to get illuminated.

Dadu: Hence, we cannot see the moon on some full moon nights. Such nights are the nights of lunar eclipse. Remember that a lunar eclipse happens only on a full moon night. When our forefathers/ancestors observed the shadow cast by the earth on the moon, it was spherical and they probably concluded that the earth is spherical.



Lunar eclipse

Maya: Oh... Our ancestors were good observers and great thinkers.

Dadu: When the entire moon is not visible during the eclipse, we call it a total lunar eclipse. When part of the moon is not visible during the eclipse, we call it a partial lunar eclipse.

Dadi: A lunar eclipse lasts for a long time, may be a few hours. This is because, the earth is too large when compared to the moon. It takes a longer time for the moon to come out of the Earth's shadow.

We can observe a lunar eclipse without any protective equipment, as it does not harm our eyes.

Maya: So, can I say that a solar eclipse occurs for a short while and we should not be observing it with our naked eyes?

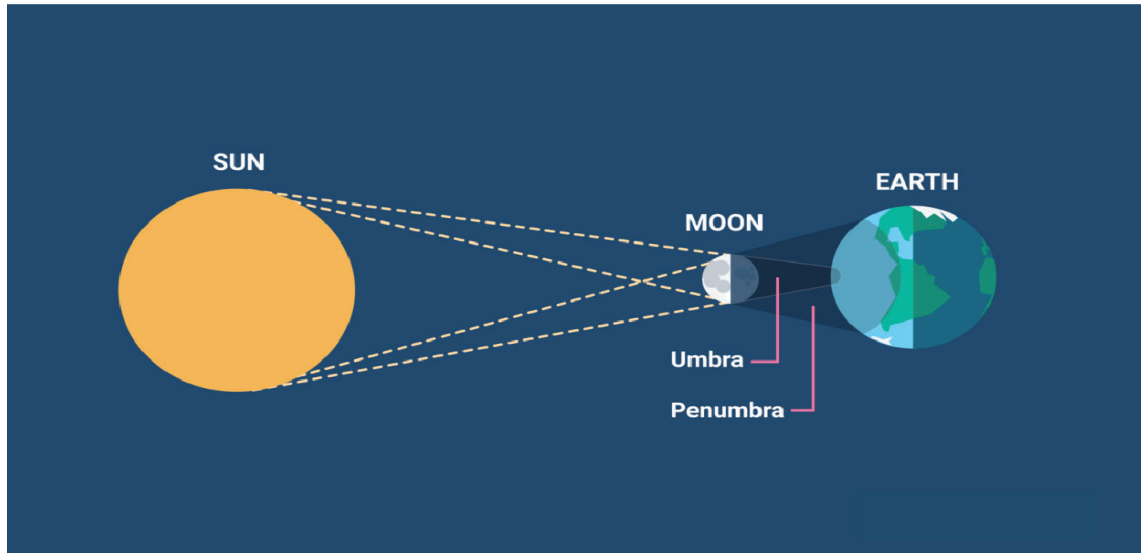


Partial lunar eclipse



Dadi: You are smart Maya. Let us understand, how a solar eclipse occurs. A solar eclipse occurs only on new moon days. On new moon days, the moon comes between the sun and the earth. On some new moon days, the position of the Moon is such that it is in a straight line between the Earth and Sun and does not allow the light from the Sun to reach the Earth. As a result, we are not able to see the Sun (partially or fully during the day at that time). This is called a solar eclipse.

When light from the sun does not reach the Earth at all, we call it a total Solar eclipse. When a part of the Sun is visible, we call it a partial Solar eclipse.



Solar Eclipse

A total Solar eclipse is rare, as the moon which blocks the light from the sun is very small compared to the Earth. For the same reason, the Earth can come out of the moon's shadow very quickly. Hence Solar eclipses last for a very short while, say for a few minutes only.



Partial solar Eclipse

Maya: Why, should we not look at the sun during a solar eclipse?



Think about...

Yuri Gagarin was a cosmonaut, while Neil Armstrong was an astronaut. Who is a cosmonaut/ astronaut? What do we call our Indian space travellers?

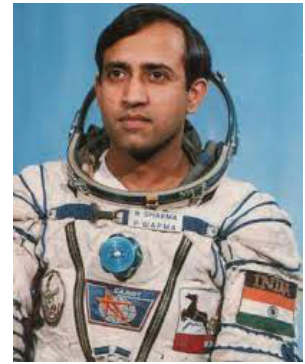
Dadi: Sun is a very hot body. We cannot look and should not look at the sun directly on any day, as the heat from the sun can harm our eyes. On the days of eclipses, the sun does not appear hot to us as it is blocked. But remember, the bright light and heat of the Sun can burn our retina leading to loss of vision. So, it is not advisable to watch a solar



eclipse with naked eyes. We need to wear special protective goggles to view a Solar eclipse.

Maya: Oh! I shall remember that when I get an opportunity to view the solar eclipse. When did the humans start exploring the space, dadi?

Dadi: The first living being to go to space was a dog named Laika. She was in the Sputnik-2 space craft, sent by Russians that left on 3rd November, 1957 to orbit the Earth.



Rakesh Sharma

Yuri Gagarin, a Russian was the first human to travel to space. He was on the first manned spacecraft named Vostok 1 on 12th April, 1961.

Valentina Tereshkova, also a Russian was the first woman to enter the space. She travelled in Vostok 6 on 16th June, 1963.

Neil Armstrong and Edwin Aldrin were the first two men to set foot on the moon. They accomplished the feat on 20th July, 1969. As Neil Armstrong descended from a ladder and took his first steps on the moon, he said “One small step for a man, a giant leap for mankind”. The spacecraft that took them to the moon was Apollo 11.

Skylab the first American space station, proved that humans could live and work in the weightless conditions of space for an extended period of time.

I remember the day when Skylab returned to the earth. There was widespread apprehension and fear that it would land on the Earth, creating widespread damage. However, it crashed across the Indian Ocean and western Australia. This was not considered a failure, as the Skylab had completed its mission in space successfully.



Scan to know about the major achievements in space program

The first Indian to venture into space was Captain Rakesh Sharma. I remember waiting in front of the television with bated breath to see the Indian in space speaking to the then Prime Minister. Our joy knew no bounds when he uttered the words “Saare Jahaan se achha” to describe our country from space.



Scan to get inspired by Rakesh Sharma's speech.

Maya: Very interesting. When did we begin our own space missions dadi?



Enrichment

Natural satellites are celestial bodies that move around planets.

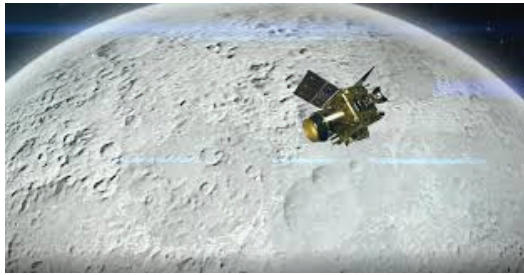
Artificial satellites are sent to space on a mission.

Dadi: The first Indian satellite “Aryabhata” was launched on 19th April, 1975, from Russia. However, we launched Rohini, using our own satellite launch vehicle SLV-3 in 1980.

India is now launching satellites of other countries from her launch vehicles. We have



the capacity to carry multiple satellites in one launch vehicle and place them in their orbits.



Chandrayaan-2



Chandrayaan-3

Chandrayaan-1 launched on 22nd October, 2008 was our maiden mission to the moon. We were able to locate water molecules. Chandrayaan-2 launched on 22nd July 2019, has placed a probe with the Indian National Flag on the surface of the moon.

Chandrayaan-3 landed on the south pole of the moon successfully on 23rd August, 2023.

I have already told you about our successful Mars mission. The Gaganyaan program was launched on our independence day in 2018, with the objective of helping humans to travel to the space. Yuva Vigyan Karyakram -2019 aims to motivate the youth of the nation to get interested and contribute to the space program of the country.

Maya: Amazing dadi. But I am going to ask you a basic doubt. What is the difference between a space craft and a satellite?

Dadi: A space craft is larger than a satellite and can carry humans and animals in it. It can be launched at a particular spot and can be used to explore that area for various findings. A satellite is something that orbits the space. It is capable of photographing various aspects of space, send and receive signals.

Satellites are used for remote sensing, prediction of weather, communication-phones, televisions, etc. Some satellites also help us to find the availability of resources in the ocean and under the Earth.

Maya: I understand that there are a lot of applications for these and each sound very interesting too. I would like to be a part of the Indian space mission, when I grow up.



Enrichment

Aditya-L1 is the Solar probe that has been launched by India.



Who is an astrophysicist?



Enrichment

Find out some fields/ branches of higher education that deals with space.

Dadi: Become an astrophysicist and contribute to the knowledge of space. For now, get ready to go out and play.



SUMMARY

- Our Mars Orbiter Mission (MOM), popularly known as Mangalyaan has made the world turn around India.
- It was launched from Satish Dhawan Space Centre, in Sriharikota, Andhra Pradesh on 5th November 2013. India was the first among the Asian nations to launch this mission.
- Indians were the pioneers in astronomy. We knew that the world was round and the planets went around the Sun and not vice-versa, long before the rest of the world thought about it.
- The almanac that we have been making for centuries gives us details about the celestial bodies and their positions in the sky, accurately.
- An eclipse is a shadow cast by heavenly bodies on each other.
- When an opaque body comes in the path of light, a shadow is formed. The shadow would be in the west in the morning, when the sun is in the east, appears in the east as the sun is in the west.
- Sun is the luminous body that provides light. All planets including the Earth and satellites including the moon are non-luminous bodies.
- The moon only reflects the light of the sun. It does not have light of its own.
- A full moon occurs when we are able to see the face of the moon that is fully lit by the sun. This occurs once in 28 days. On new moon days, the earth faces that side of the moon that does not receive sunlight. So, we do not see the moon on that day. This again occurs once in 28 days.
- A lunar eclipse happens only on a full moon night. When the entire moon is not visible during the eclipse, we call it a total lunar eclipse. When part of the moon is not visible during the eclipse, we call it a partial lunar eclipse.
- A lunar eclipse lasts for a long time, may be a few hours however, a solar eclipse occurs for a short while.
- The first living being to go to space was a dog named Laika. She was in the Sputnik-2 space craft, sent by Russians that left on 3rd November, 1957 to orbit the Earth.
- Neil Armstrong and Edwin Aldrin were the first two men to set foot on the moon. They accomplished the feat on 20th July, 1969.
- The first Indian to venture into space was Captain Rakesh Sharma.
- The first Indian satellite “Aryabhata” was launched on 19th April, 1975, from Russia.
- Chandrayaan-1 launched on 22nd October, 2008 was our maiden mission to the moon. We were able to locate water molecules. Chandrayaan-2 launched on



22nd July 2019, has placed a probe with the Indian National Flag on the surface of the moon.

- A space craft is larger than a satellite and can carry humans and animals in it.
- A satellite is something that orbits the space. It is capable of photographing various aspects of space, send and receive signals. They are used for remote sensing, prediction of weather, communication-phones, televisions, etc.



I. Fill in the blanks

1. Our Mars Orbiter Mission (MOM), popularly known as _____ Mangalyaan
2. The _____ almanac gives us details about the celestial bodies and their positions in the sky, accurately.
3. An eclipse is a _____ shadow cast by heavenly bodies on each other.
4. When an _____ opaque body comes in the path of light, a shadow is formed.
5. Luminous bodies have their own _____ light.
6. The moon only reflects the light of the _____ sun.
7. A solar eclipse occurs only on _____ new moon days.
8. The first living being to go to space was a _____ named _____ Laika.
9. A lunar eclipse lasts for a _____ however, a solar eclipse occurs for a _____.
10. The first two men to set foot on the moon were _____ Neil Armstrong and _____ Edwin Aldrin.
11. The first Indian satellite _____ "Aryabhata" was launched on 19th April, 1975, from Russia.
12. Chandrayaan-1 was able to locate _____ water molecules on the surface of the moon.
13. The _____ Gaganyaan program was launched with the objective of helping humans to travel to the space.
14. A _____ satellite is an object that orbits the space.



II. Name the following

1. Our Mars Orbiter Mission is popularly known as.
2. India's first mission to moon.
3. The device used to observe celestial bodies.
4. A shadow cast by heavenly bodies on each other.
5. The satellite built by girls from across the country.
6. The space station from where Mangalyaan was launched

III. Name the first

1. Woman to enter into the space.
2. Living being to go into space.
3. Indian satellite that was launched from Russia.
4. Indian to land in space.
5. Persons to step foot on moon.

IV. Who are they?

1. The Father of Indian Space Program.
2. The Missile man of India.
3. The inventor of telescope

V. Expand the following

1. ISRO
2. INCOSPAR
3. MOM
4. NASA
5. SLV

VI. Match the following

1.	Mangalyaan	12 th April, 1961.	
2.	Sputnik-2 space craft	20 th July, 1969.	
3.	Vostok 1	5 th November 2013.	

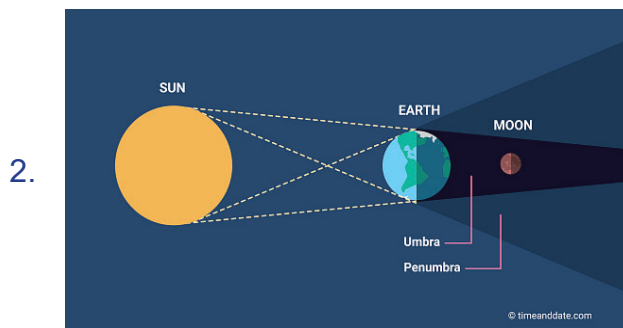
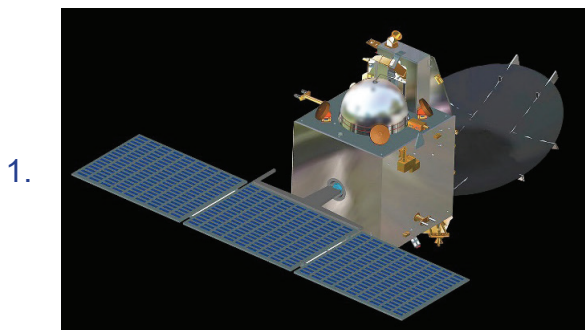


4.	Apollo 11.	19th April, 1975	
5.	“Aryabhata	3rd November, 1957	

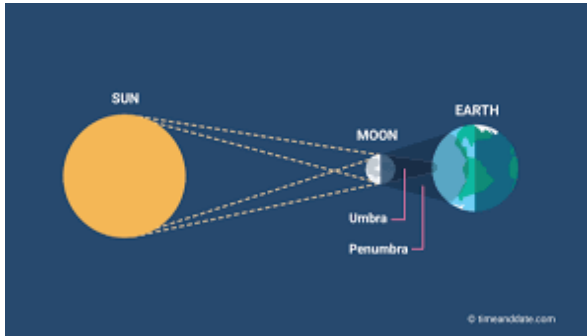
VII. Answer the following:

1. What are shadows?
2. What is a payload in rocket?
3. Why do we see one side of the moon always?
4. What are the precautions to be taken while observing a Solar Eclipse?
5. Total lunar eclipses are not rare while total solar eclipses are. Justify.
6. What are satellites? How are they useful?
7. Explain the occurrence of lunar eclipse with the help of a neat labelled diagram.

VIII. Identify the following



4.



5.



IX. Task

- Using two balls and a torch light try to show the occurrence of
 - Solar Eclipse
 - Lunar Eclipse

Check

The relative size of the ball chosen for the moon and the earth.

Which is bigger? Why?

Observe the shadow and make a record of your observations and explain this phenomenon to your friends.

- India has launched Chandrayaan-3 successfully.
 - Make a chart of how it is different from Chandrayaan-1 and 2
 - Explore to find out about the purpose of the mission. Share with your friends in class.
- If you get a chance to go to space. Which planet would you like to explore? Why?
- Explore about project ADITYA-L1. Jot down your findings. Make a presentation of it in your class.





Do plants eat?

14



Expected Learning Outcomes

Students...

know the meaning of CNG, carbon footprint, photosynthesis, autotrophs, heterotrophs, producers and consumers of food chain, insectivorous plants, saprophytes, parasites, symbionts

understand the different modes of nutrition intake in plants – Insectivorous plants (e.g., pitcher plant, venus flytrap, sundew); Carnivorous plants (e.g., rafflesia); Saprophytes (e.g., mushroom); Parasitic plants (e.g., mistletoe, dodder); Symbionts (e.g., lichens)

understand how CNG is a better fuel than petrol and diesel, to reduce carbon footprint,

locate state/s, capital/s, rivers, tributaries and other geographical divisions mentioned in this lesson on a political map of India.



Largest and oldest botanical garden of India

The **Great Banyan tree** at Shibpur is over 250 years old and covers about 3.5 acres at **Acharya Jagadish Chandra Bose Botanical Garden** near Kolkata. It is one of the widest trees in the world. It has at present 3772 aerial roots reaching down to the ground as prop root. It is almost as high as the Gateway of India.



Shraddha and Saatvik were feeling hungry when they returned home from school. They wanted to have some food, before they can go out to play.

They leave their bags and shoes in the appropriate places, wash their hands and are ready to eat. Their doddamma (**mother's elder sister in Kannada**) is busy in the kitchen, to provide them something nutritious and tasty.

Shraddha: Doddamma, I am very hungry today. I want to eat something right away.

Doddamma: Hunger indicates that you are healthy and your body needs to refuel itself to perform its functions.

Saatvik: Fuel? I thought only vehicles need a fuel to run.

Doddamma: A source of energy or fuel is required for everything to function. We also need to remember that the fuel also determines the quality and quantity of energy that we get.

Shraddha: My teachers have always told us about the need to have saatvik food, as the food not only influences our body, but also our mind.

You say that food is a fuel doddamma, so does it mean that the fuel that we use in our vehicles can also affect their efficiency?

Doddamma: Definitely. For instance, the petrol that we were using earlier had sulphur in it. It caused corrosion of engines and also polluted the atmosphere. But now we get fuels from which sulphur has been removed.

We have also moved on to other fuels like CNG and electricity for our vehicles.

Shraddha: I know CNG is Compressed Natural Gas. But why is it a better fuel than petrol?

Doddamma: Between petrol and diesel, petrol is better as it pollutes less. CNG is better than both of them because, the pollution that it causes is extremely less. It also releases a large amount of energy as it is a gaseous fuel. So, the amount of fuel that is required is also less when compared to petrol and diesel.

Shraddha: That is very interesting doddamma.

Saatvik: I read in our school magazine about something called the carbon footprint. It said that the more we use fuels like petrol and diesel, we leave more carbon footprint. I understood that we need to reduce the carbon footprint. It is said that the citizens of United States of America leave the maximum footprint, in proportion to the population of that country.



Carbon footprint



Doddamma: You have understood it right Saatvik. Carbon footprint is the amount of carbon dioxide and other greenhouse gases that we add to the atmosphere by our activities. All the fossil fuels that we use leave a carbon footprint.

Shradha: So, CNG and electricity are clean fuels that leave less of carbon footprint?

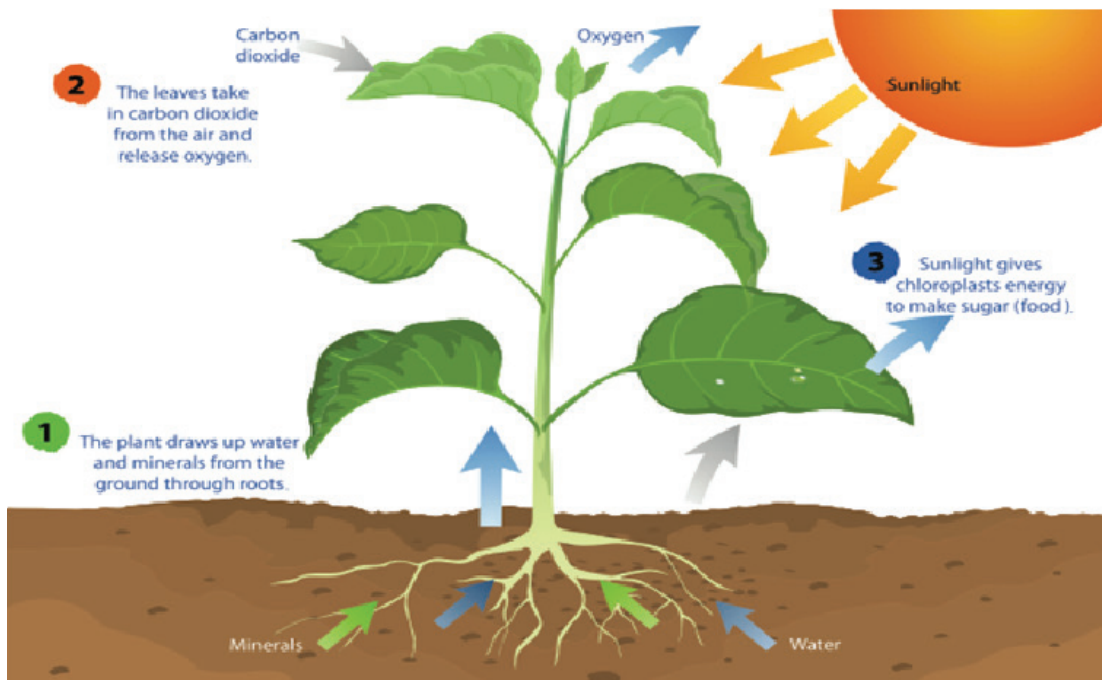
Doddamma: Broadly yes. But we need to look at how we produce electricity. When we burn coal to produce electricity, we again release carbon dioxide and other pollutants into the atmosphere, which can increase the carbon footprint. When we use less of electricity and fossil fuels, we reduce our carbon footprint. Growing plants as much as possible in urban areas and afforestation help us live in a clean environment, as plants are capable of offsetting the carbon footprint to a large extent.

Shradha: Plants are lucky, we feed them with water and manure and they get their energy.

Saatvik: No Shradha, I don't think plants are fed when we irrigate the fields.

Doddamma: You are right Saatvik. Think of how plants prepare their food. You have been learning about it from your nursery days.

Shradha: Oh...yes doddamma. Plants prepare their food with the help of sunlight, water from the soil and carbon dioxide from the atmosphere using the chlorophyll that is present in its leaves by the process of photosynthesis.



Doddamma: Good you recollected it well.

Ponder

Name two greenhouse gases other than carbon dioxide.



Shraddha: Is there any other organism that can prepare its food that way doddamma?

Doddamma: Can you think of any other organism that has chlorophyll Shraddha?

Shraddha: No doddamma.

Doddamma: Plants are the only organisms that can use ingredients that are present in nature to prepare their food. That is why they are called autotrophs or producers. All other organisms are dependent on plants either directly or indirectly for food.

Saatvik:(hurriedly): But carnivores like the lion and tiger are not dependent on plants for food.

Doddamma: Shall we check whether they are dependent or not dependent on plants for food?

Saatvik: Yes doddamma. I am very sure. They eat only other animals.

Doddamma: Now tell me what they eat?

Saatvik: They eat deer, buffaloes and other herbivores.

Doddamma: What do these herbivores eat?

Saatvik: They eat plants. So, indirectly they are also dependent on plants for food.

Doddamma: Recollect the food chain that you have learnt in school. You will understand how the carnivores are dependent on green plants. If there are no green plants, deer and buffalo would not get food. In turn, the lions and tigers will also not have food.

Saatvik: Now I recollect doddamma. So, all organisms are dependent on green plants either directly or indirectly for food.

Doddamma: That is why green plants are called the “producers” or autotrophs and all other organisms are called the “consumers” or heterotrophs

Shraddha: That’s interesting doddamma.

Doddamma: There are some plants which depend on other organisms for nutrition. They include insectivorous plants such as pitcher plant, venus flytrap, sundew plant and also carnivorous plants like rafflesia.

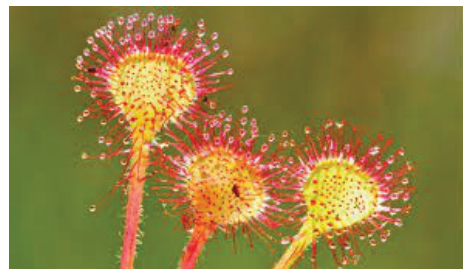
Saatvik: Insectivorous plants?

Doddamma: Plants also need nutrients like nitrogen, potash, calcium, magnesium, iron, copper, etc. They get these nutrients from the soil. In some parts of the world, the amount



Enrichment

Sundew seems to have something like water droplets on its surface that are sticky glue-like. Insects come to the plant assuming they are water droplets. When they come in contact with the glue, they get stuck to the plant and are devoured by it.



of nitrogen that is present in the soil is very less. So, to obtain nitrogen, plants are modified to obtain it from insects. Such plants are called **insectivorous plants**.



Venus flytrap



Pitcher plant

For example, the leaf of a pitcher plant is shaped like a pitcher, with a lid on top. When insects fall into the pitcher, the lid closes. The fluids present in it take the essential nutrients from the insects.

Venus flytrap has structures with which it can trap the insects. Venus flytrap and pitcher plants are found in Meghalaya, while Sundew is found in West Bengal.

We also have carnivorous plants like rafflesia.

Shraddha: Carnivorous plants!?



Rafflesia

Doddamma: Rafflesia is a large flower found in the equatorial region. It is so large that it is about 3 feet wide and can weigh around 5-6 kg. The area around the flower stinks of decaying animal matter.

When an insect falls into that flower, it is digested, and the plant gets its nutrition.

Shraddha: I remember you telling that the insectivorous plants partly depend on insects for

food. But does rafflesia not prepare its food at all?

Doddamma: It is a parasitic plant, with no roots and leaves seen. It attaches itself to another plant to obtain water and nutrients. The buds of Rafflesia arise from the lower stem of the host close to the ground.

Saatvik: What are parasites doddamma?

Doddamma: Parasites live on another living organisms and also obtain their food from them. Among animals, lice and ticks are good examples. Pathogens that cause diseases are also parasites. Among plants, mistletoe and dodder are common examples of parasites. As I told you just now, rafflesia is also a parasite.





Mistletoe growing on a tree



Dodder

ACTIVITY

Name a few insectivorous plants found in India.

Shraddha: That is interesting. I did not get the name for organisms that depend on plants for food.

Doddamma: Organisms that depend on plants either directly or indirectly for food are called **heterotrophs**. There are many groups among the

heterotrophs. You know that animals can be either herbivores, carnivores or omnivores while plants could be saprophytes, parasites and symbionts.

Shraddha: That's interesting. Tell us more doddamma.

Doddamma: We have already seen about Parasites. Saprophytes are organisms that live on decaying organic matter. Have you seen what happens when you leave aside bread for a few days?

Saatvik: There is a black and white growth on it and we should not use such bread.

Doddamma: That's correct. This black and white growth is called the bread mould. It belongs to the fungi family. Bread mould grows on decaying organic matter. It grows well in warm, moist places. Another example could be the white coating that you see on wooden furniture after rainy days, especially when they are not in use.

Shraddha: Is that the one that I also see on tree barks and roots like a white umbrella after the rains?

Doddamma: Good observation Shraddha. They too are saprophytes or saprotrophs.

Symbiotic organisms teach us a good life lesson. Two organisms live in symbiosis with each other. Each one depends on the other for certain things. Thus, they have to help each other to live together.

An example of this is an alga and a fungus living together. The alga contains chlorophyll with which it can make food. The fungus provides the alga the substratum and moisture to make food. Thus, they live together and benefit from each other. The algae and fungi together is called lichen.

Saatvik: Symbiotic living is quite interesting and worth following.



SUMMARY

- Hunger indicates that we are healthy and our body needs to refuel itself to perform its functions.
- Fuels determine the quality and quantity of energy produced.
- Carbon footprint is the amount of carbon dioxide and other greenhouse gases that we add to the atmosphere by our activities. All the fossil fuels that we use leave a carbon footprint.
- When we use less of electricity and fossil fuels, we reduce our carbon footprint.
- Growing plants and afforestation help us live in a clean environment, as plants are capable of offsetting the carbon footprint to a large extent.
- Plants prepare their food with the help of sunlight, water from the soil and carbon dioxide from the atmosphere using the chlorophyll that is present in its leaves by the process of photosynthesis.
- Plants are called autotrophs, as they are the only organisms that can use ingredients that are present in nature to prepare their food. All other organisms are dependent on plants either directly or indirectly for food and are called heterotrophs.
- There are some plants which depend on other organisms for nutrition. They include insectivorous plants such as pitcher plant, venus flytrap, sundew plant and also carnivorous plants like rafflesia.
- Parasites are organisms which live on other organisms and obtain food from them. Lice and ticks are parasitic animals while mistletoe and dodder are parasitic plants.
- Plants need nutrients like nitrogen, potash, calcium, magnesium, iron, copper, etc. They get these nutrients from the soil.
- Saprophytes are organisms that live on decaying organic matter. Eg: bread mould
- Symbiosis is a relationship where two organisms depend on each other to live. Algae and fungi (Lichen) live together in symbiosis with each other. The alga contains chlorophyll with which it can make food. The fungus provides the alga the substratum and moisture to make food. Thus, they live together and benefit from each other.





I) Fill in the blanks

1. CNG means _____ Compressed Natural Gas
2. When we use fuels like petrol and diesel, we leave more _____ carbon footprint.
3. Carbon footprint is the amount of _____ carbon dioxide and _____ other greenhouse gases that we add to the atmosphere by our activities.
4. Organisms that depend on plants either directly or indirectly for food are called _____ heterotrophs
5. Insectivorous plants partly depend on _____ insects for food.
6. Organisms that live on decaying organic matter are called _____
7. Algae and fungi together is called _____ lichen.
8. Rafflesia is a _____

II Name the following

1. Two plant parasites.
2. Two animal parasites.
3. Two fossil fuels.
4. Two gaseous fuels.
5. Clean fuels that leave less of carbon footprint.
6. Our mind and body can be healthy by eating this kind of food.
7. The country that leaves the most carbon foot print, in proportion to its population.
8. The greenhouse gas that is released on burning fossil fuels.



III Match the following

1.	Growing trees	Producers	
2.	Autotrophs	Heterotrophs	
3.	Consumers	Pitcher plant	
4.	Insectivorous plants	Lichen	
5.	Symbiosis	Afforestation	

IV Differentiate between

1. Autotrophs and heterotrophs.
2. Saprophyte and parasite.
3. Herbivores and carnivores.

V Answer the following

1. What is carbon footprint?
2. How do green plants prepare their food?
3. Why green plants are called Autotrophs?
4. What are omnivores?
5. Name a few nutrients that plants need? How do plants get these nutrients?
6. How do insectivorous plants get their nutrition?
7. What are parasitic plants?
8. How can we reduce carbon foot print?
9. Explain symbiosis with an example.

VI Draw and label

1. Pitcher plant
2. Venus fly trap
3. Sun dew plant

VII Diagrammatically depict photosynthesis



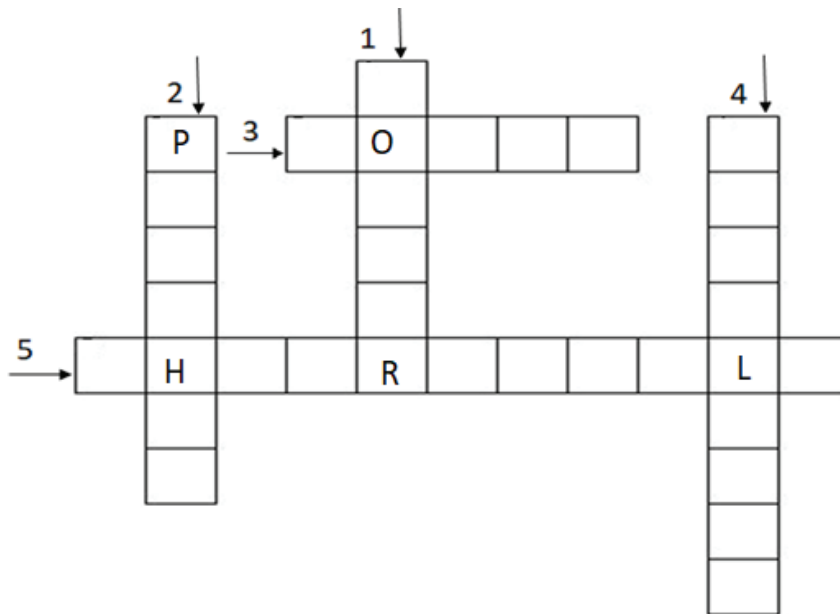
VIII Solve

ACROSS

- I grow on bread when left in the dark. I make you sick if eaten.
- Plants are green because of me.

DOWN

- I am a parasite with string like stem and no leaves
- I am an insectivorous plant. I grow in Meghalaya.
- I am a large carnivorous flower.



IX Map work

On a political map of India mark the state

- That has the largest oil well-Maharashtra.
- The oldest oil field – Assam.
- Where Sundew grows.
- Where Venus Flytrap is found.

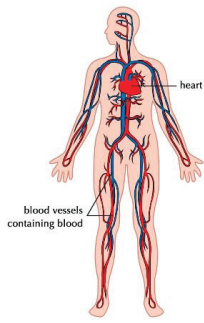
X Proposed activity

- Make a poster on the effects of large carbon foot print.
- Explore:

Shri Jagadish Chandra Bose was a scientist, who explained to the world that plants have life. Find out more about him and his work. Present it in your class.

- Collect pictures of saprophytes, parasites and symbionts, name them. Write at least 4 sentences about each of them.





Go with the flow

15



Expected Learning Outcomes

Students...

know the functions of the heart, **that** RBC carries oxygen, **how** to observe the number of heartbeats per minute

know what is/are haemoglobin, arteries, veins, capillaries, anaemia, circulatory system, blood groups, blood transfusion

understand the structure of the heart, the components of blood and their function,

understand how you get energy to play, blood donation saves lives, **why** iron should be an important component of our food, you breathe fast after playing a game,



Is all blood red! Let us check...



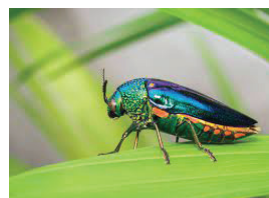
1. Octopuses, spiders, crabs have blue blood due to the presence of hemocyanin.

2. Green is the colour of the blood in leeches and marine worms. It is due to the presence of chlorocruorin.



3. Some marine worms have a purple blood due to the presence of hemerythrin.

4. Beetles and sea cucumber have vanabin in their blood which gives it a yellow colour.



Ramdhular and Aabha are siblings studying in class V. They had fun with a big round of run and catch for about 20 minutes after school. They enter the house puffing and panting to find that their **fufa** (father's sister in Bhojpuri, the language spoken in Bihar) and **fua** (father's sister's husband in Bhojpuri) have come with their children, Rinu and Charan for a visit.

Ramdhular and **Aabha**: Namaste fuaji and fufaji.

Fufaji : Namaste Rinu and Charan. Very happy to see you all.

Fufa: We are also happy to see you all. Sit down for some time. Your puffing and panting tells me that you have been playing a physically strenuous game for quite some time. What were you playing?



Kho-kho

Aabha: We and our friends were playing a game of run and catch and also a round of kho-kho. It was real fun, running to escape from being caught. But, now we are gasping for breath and sweating a lot.

Fua: Do you know why you breathe hard or gasp when you play a game like this?

Aabha: I don't know fua.

Fua: What do you primarily need to play a game like this?

Rinu: A lot of energy.

Fufa: How do you get the energy?

Charan: From the food we eat.

Ramdhular's and Aabha's mother and father also join the conversation. They are mama and mami to Rinu and Charan

Fufa: Very true, when the digested food combines with oxygen, energy is released. When you run around and play, our body requires more energy. Thus, it requires more oxygen. Hence, to take in more oxygen, your breathing rate increases.

Charan: I understand, but I also feel that my heart pounds when I run. I have also observed that my heart beats very fast when I vigorously exercise.

Mama: That is a good observation Charan. Can you think of why it is so?

Charan: I am not able to find out mamaji.

Mama: The heart is the organ that pumps blood to all parts of the body. It is the blood that carries oxygen to every cell of our body.



Ramdhular: Blood carries oxygen! How does it do?

Mami: I am sure you know that the blood flows through almost all the parts of our body.

Let us now look at the composition of blood. Blood has three major components. The liquid component of the blood is called the plasma. In the plasma are suspended the red blood corpuscles (RBC), white blood corpuscles (WBC) and the platelets.

Charan: Does the RBC give the red colour to the blood?

Mama: Yes. Let us look at it in a little more detail. The RBC contains haemoglobin that gives the red colour to our blood. All vertebrates have an iron-rich haemoglobin that carries oxygen to all parts of the body.

Aabha: I am able to relate it to what we studied in EVS. My teacher said, if you are deficient of iron, you would feel tired, as your blood would not be able to carry enough oxygen to all parts of the body. Now I understand why it is so.



Enrichment

Anaemia is a condition when there is not enough red blood cells or haemoglobin.

Mami: Good! The blood that is rich in oxygen reaches all the cells of the body. The carbon dioxide from the cell is collected by the blood and it reaches the heart and then the lungs to be exhaled.

Aabha: That seems to be a complex process. The heart, I have observed beats rhythmically. You said that it pumps blood to all the parts of the body. How does it happen?

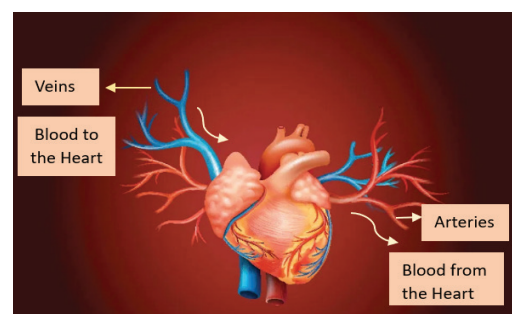
Mama: The heart is made of cardiac muscles. These are very strong. They continue to work ceaselessly right from when we are in our mother's womb.

It is just the size of our fist.

It has four chambers, two upper chambers and the two lower chambers. They are like the rooms of our house. When the upper chambers close the lower ones open and vice-versa. Thus, you hear the rhythmic beat of the heart. The oxygen rich blood from the heart is taken to all parts of our body by strong blood vessels called the arteries. Arteries are elastic and are thick walled to withstand the pressure of blood pumped by the heart, as the blood has to reach all parts of the body.

The carbon dioxide rich blood reaches our heart through the blood vessels called the veins. This is

Ponder
Some parts of our body do not have blood vessels. Can you name two of them?



sent to the lungs. Carbon dioxide is removed here and the blood gets re-oxygenated. This oxygenated blood reaches the heart and is pumped to all parts of the body through the arteries. The veins are not elastic or thick walled as the arteries because the pressure of the blood reaching the heart is less than the pressure with which the blood flows from the heart. There are small blood vessels called capillaries that interconnect the arteries and the veins.

Ramdhular: That is very interesting. Are these arteries, veins and capillaries nerves?



Enrichment

Elasticity is the ability to expand and contract.

Fua: Oh dear! You have learnt about nerves in your EVS earlier. They carry electrical signals from the brain to different parts of the body and vice-versa. Arteries, veins and capillaries are known as the blood vessels, as they help in transportation of blood. When the health care

workers collect sample of blood from us they collect it from our veins. When one is extremely sick medicines are given intra-venously so that they act immediately.

When you go to a physician, what does he do to examine first?

Aabha: He checks our pulse.

Mama: You are right. Now try to check your pulse. Use your right hand to check the pulse at your left hand, or vice-versa. You may need some time to identify and observe the beat, as you are doing it for the first time.

Rinu: I am able to feel it. There is a throbbing similar to that of the heartbeat.

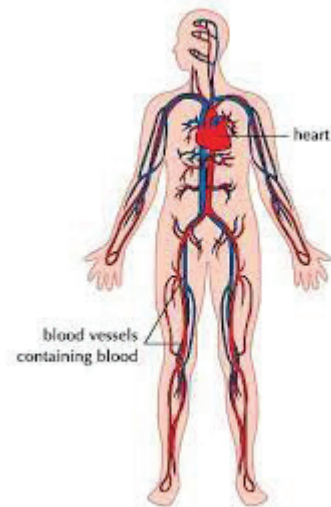
Mama: Superb! You are indeed feeling the blood being pumped through the artery by your heart. Now count how many times it beats in one minute.

Rinu: (Rinu observes) It looks like it is about 70 times.

Charan: Mine is about 68 times

Mami: Great. It tells us the number of heart beats per minute. Since the blood passes through the artery with the same force as it is received from the heart, the pulse rate tells us the heart rate too. The heart can beat from 60 to about 100 times per minute. We can feel our pulse at our wrists, our ankles and also at our neck, to mention a few parts.

Ramdhular: Fufa, we were discussing about components of blood. We discussed only RBC, tell me more about the others too.



Checking the pulse



Fufa: Plasma is the liquid portion of blood. It is primarily responsible for transport of nutrients and removal of wastes from the cells of the body. The white blood cells (WBC) help us to fight infections. The platelets present in the blood help the blood to clot when there is a bleeding injury, thus preventing loss of blood. As you know the RBC is responsible for transport of oxygen to all parts of the body.

Rinu: I see in the requests for blood when people are very sick about different blood groups. What are they?

Mama: The major blood groups known are A, B, AB and O. Further, it is also indicated as positive or negative. This grouping is based on the presence or absence of a certain factor in the blood call the RH factor. This is important when there is a need for blood transfusion, because we need to administer the correct blood group to the patient. Doing otherwise, can be fatal.

Charan: What is blood transfusion?

Mami: When one is extremely anaemic due to some disease, or in the case of huge loss of blood during an accident or surgery, or due to some medical condition, the only way to save the person's life could be through blood transfusion, where blood from another human being called the donor is administered to the patient, to help him recoup.

Rinu: So, the person who donates blood is called a blood donor?.

Mama: Rightly said. Healthy individuals between the age of 18 years and 60 years, with a body weight of 45 kg or more, and haemoglobin of at least 12 mg/100 mL can donate blood. A man can donate once in 3 months, while a woman can do once in 4 months. Blood donation does not make a person sick, in fact blood donated by one person can save upto three lives.



Ponder

Find out how one unit of blood can save at least three lives.

Rinu: I have learnt about the digestive system, skeletal system etc. Do the heart and blood vessels belong to any system of our body?

Fua: Definitely. The heart and the blood vessels form our circulatory system, as these help in circulation of blood throughout our body.



Ponder

What are the causes of anaemia?

The medical specialty of treating the diseases of the heart is known as cardiology. Do you know that there are doctors who specialize in the treatment of blood disorders?

Ramdhular and **Rinu** No.



Fufa: The specialist who treats the disorders of the blood is known as haematologist and those who surgically treat the disorders of the blood vessels are known as vascular surgeons.

Ramdhular and **Aabha:** The discussion was so interesting that we forgot to even have our snacks after school. We will quickly freshen up and join you all for some snacks.

SUMMARY

- The heart is the organ that pumps blood to all parts of the body. It is the blood that carries oxygen to every cell of our body.
- Blood has three major components. The liquid component of the blood is called the plasma. In the plasma are suspended the red blood corpuscles (RBC), white blood corpuscles (WBC) and the platelets.
- The RBC contains haemoglobin that gives a red colour to our blood. All vertebrates have an iron-rich haemoglobin that carries oxygen to all parts of the body.
- The blood that is rich in oxygen reaches all the cells of the body. The carbon dioxide from the cell is collected by the blood and it reaches the heart and then the lungs to be exhaled.
- The heart is made of cardiac muscles which are very strong.
- The heart has four chambers, two upper chambers and the two lower chambers. The heart can beat from 60 to about 100 times per minute. We can feel our pulse at our wrists, our ankles and also at our neck
- Arteries are blood vessels that carry oxygen rich blood to all parts of the body.
- Veins are blood vessels that carry carbon dioxide rich blood from all parts of our body to the heart.
- The veins are not elastic or thick walled as the arteries.
- Blood vessels called capillaries interconnect the arteries and the veins.
- Arteries, veins and capillaries are known as the blood vessels, as they help in transportation of blood.
- The white blood cells (WBC) help us to fight infections. The platelets help the blood to clot when there is a bleeding injury, thus preventing loss of blood. Plasma is the liquid portion of blood. It is primarily responsible for transport of nutrients and removal of wastes from the cells of the body.
- The major blood groups known are A, B, AB and O. This grouping is based on the presence or absence of a certain factor in the blood called the RH factor.
- Transferring blood from one person to other is called blood transfusion.
- Healthy individuals between the age of 18 years and 60 years, with a body weight of 45 kg or more, and haemoglobin of at least 12 mg/100 mL can donate blood.
- The medical specialty of treating the diseases of the heart is known as cardiology.





I Fill in the blanks.

1. We spend a lot of _____ when we play games.
2. Blood is pumped to all parts of the body by the _____
3. The liquid component of the blood is _____.
4. Haemoglobin is present in the _____ cells of the blood.
5. The specialty of treating diseases of the heart is known as _____.
6. The grouping of blood is based on the presence or absence of a certain factor called the _____ factor.
7. Blood vessels called _____ interconnect the arteries and the veins
8. The _____ present in the blood help the blood to clot when there is a bleeding injury.
9. Elasticity is the ability to _____ and _____.
10. Healthy individuals between the age of _____ and _____ can donate blood.

II Choose the right Answer

1. The major blood groups can be
a. Positive b. Negative c. Neutral d. None of the above
2. The liquid portion of blood that is responsible for transport of nutrients and removal of wastes from the cells of the body.
a. RBC b. Platelets c. Haemoglobin d. Plasma
3. The throbbing feeling similar to heartbeat
a. Heart rate b. beat c. Pulse d. Blood pressure
4. Component of blood that helps in clotting
a. RBC b. platelets c. WBC d. Plasma



5. Haemoglobin of a healthy individual of the age of 18-60 years who can donate blood is

- a. 15 mg/100 mL b. 30 mg/100 mL c. 45 mg/100 mL d. 12 mg/100 mL

III Match the Following

1.	Arteries	Thin walled and not so elastic	
2.	Veins	elastic and are thick walled	
3.	Capillaries	Cardiology	
4.	Treatment of heart disease	Heart beat	
5.	Pulse	small blood vessels	

IV Answer the following

1. How do you measure your heart rate?
2. What is blood transfusion?
3. Who is a haematologist?
4. Describe the structure and functions of a human heart.
5. Differentiate between arteries and veins.
6. Name the major blood groups.
7. Explain the functions of different components of blood.



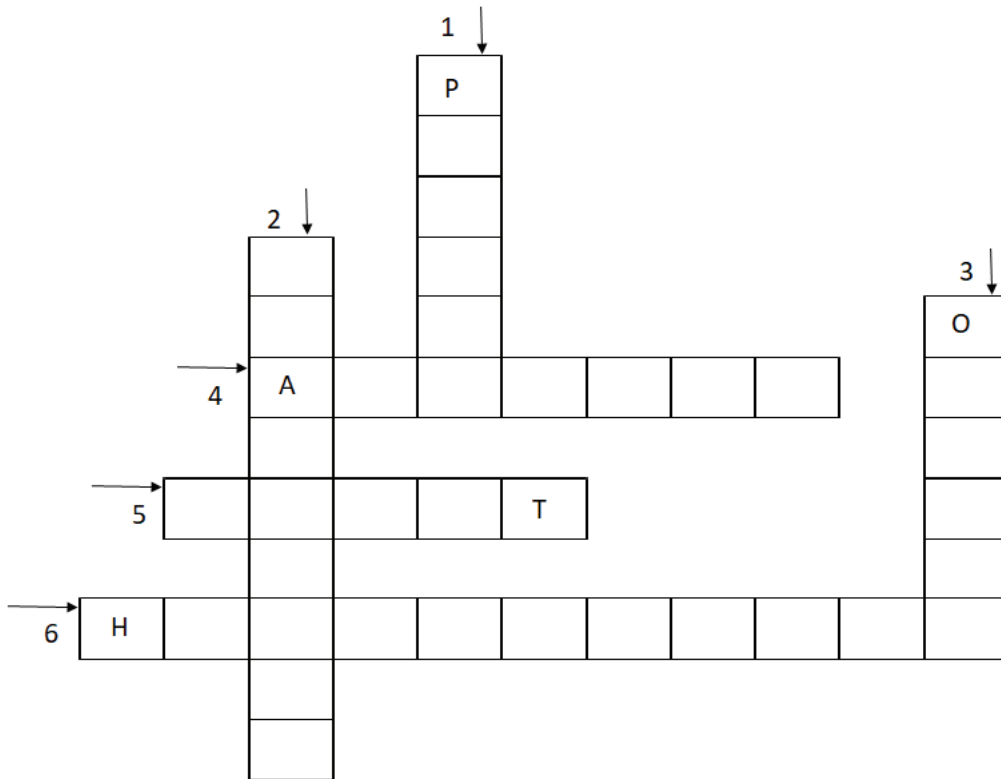
V. Solve the puzzle.

ACROSS

- 4. Deficiency of iron causes this disease
- 5. The organ that pumps blood to all parts of the body
- 6. The RBC contains this pigment

DOWN

- 1. The liquid component of blood
- 2. The component of blood that helps in clotting.
- 3. This gas is essential for energy to be released from digested food.



SIMPLE MACHINES



How do we make our work easy?

16



Expected Learning Outcomes

Students...

know what is/are machine, simple machines, the three orders of levers, fulcrum, load and effort, inclined plane, a pulley, load arm, effort arm and fulcrum in a simple machine,

know how a wedge is formed, pulleys are used

understand how first, second and third order levers work, a pulley works, a screw is a modified inclined plane



Our ancestors would have found protecting themselves from wild animals, finding food and clearing the forests to make safe-homes a challenge, with no machines or electricity.

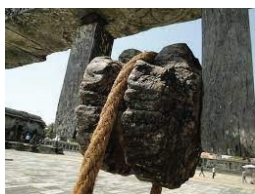
The first machine that they made was a simple machine, an axe that was made by chipping a flint to make a hand axe.

Slowly they moved on to make an inclined plane to roll and move heavy objects with less effort.

The other simple machines, the lever, wheel and axle, pulley, screw came on as the need to make work easier increased.

These simple machines, have simply been around since time immemorial, making one's life easier, simpler and also paving way for more complex machines of the modern world.

ANCIENT SIMPLE MACHINES



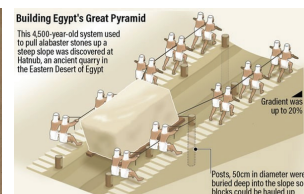
Pulley



Screw



Hand Axe-Flint



Inclined plane



Acharya: Namaste children.

Children: Namaste acharya. We are trying to break open this shell to get the walnut that's inside. We are not able to and the break time is over.

Acharya: You can use a nutcracker to do it. Let me give you one. Use this to crack it.

Karan: Thank you acharya. But we have not seen you carry it to class. How did you know we might need it today?

Acharya: Today I thought we would discuss "Simple Machines". So, I carried a few of them to class.

She pulls them out from her bag and arranges on the table.

Yug: You mean to say that nutcracker, scissors and sewing needle are simple machines?

Acharya: Yes. Anything that makes our work easier is a machine. A machine uses lesser energy to complete a task. When the energy that is used is just mechanical energy, and the number of moving parts are few or nothing, the machine is a simple machine. For example, when we use a pair of scissors, the muscular energy (mechanical energy) is used to move the pair of scissors, which in turn cuts the paper.

Anand: That's very interesting. Please let us know more about it acharya.

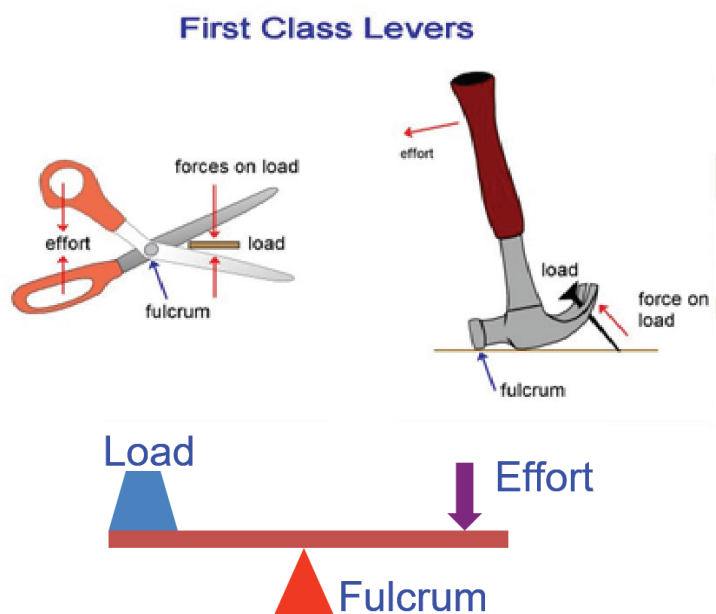
Acharya: We have a group of simple machines called the lever. A lever has a fulcrum, load and effort.

Babu: What are they acharya?

Acharya: Let us take a look at the pair of scissors. There is a fixed point on the scissors. The fixed point on a lever, about which the lever moves is called the fulcrum. The scissors work on the object that we have to cut, which is called the load. We apply our **effort** on the other end of the lever. Thus, in the scissors we have the fulcrum in between the load and the effort. The levers in which the fulcrum is between the load and the effort is called a **first order lever**.

Dev: Then do we have other orders of levers too acharya?

Acharya: Yes. Now take a look at the nut cracker.



Observe where the fulcrum, load and effort are.

Eshaan: It has fulcrum at one end, the effort at the other end, and the load in between.

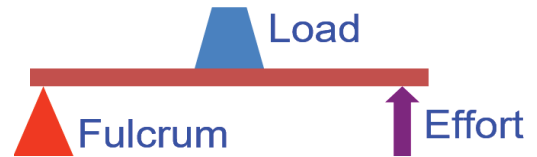
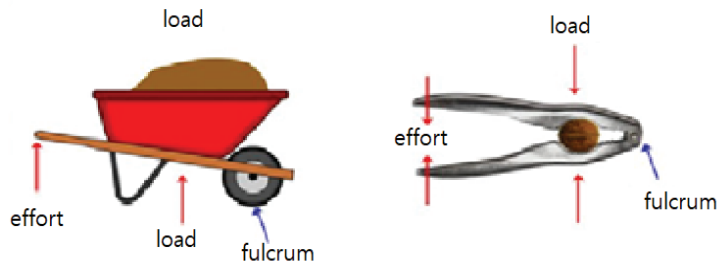
Acharya: Levers in which the load is between the fulcrum and the effort belong to the **second order lever**.

Fadendra: Do we have **third order levers** too?

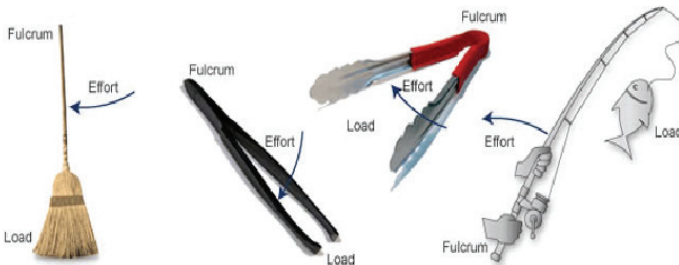
Acharya: Yes, we have.

Fadendra: Then, do they have the effort between the fulcrum and the load?

Second Class Levers



Third Class Levers



Acharya: Very true.

The part between the fulcrum and the load is called the load arm and that between the fulcrum and the effort is called the effort arm.

Guha: Are there some more simple machines also Acharya?

Acharya: When you have to carry a suitcase, you would like to carry it along the staircase or a ramp?

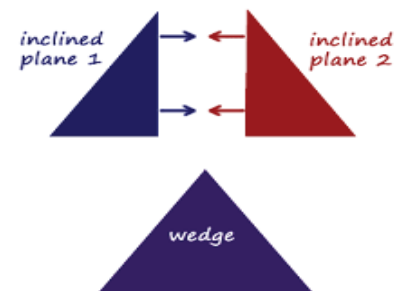
Hari: Definitely a ramp. It's easier to pull anything on a ramp than lug it up the stairs. I have seen how in a hospital they

wheel in patients on a ramp easily.

Acharya: The ramp is an example of a simple machine, called the **inclined plane**. When two inclined planes combine as I show on the board (teacher draws on the board), it becomes a wedge.

What do we do, when we have to fix two wooden planks one above the other?

Kala: We either use nails or screws to fix them.



Acharya: I am sure you know that the nail is also an example of a wedge.

Kumari : Acharya, how do you say that a nail is a wedge.



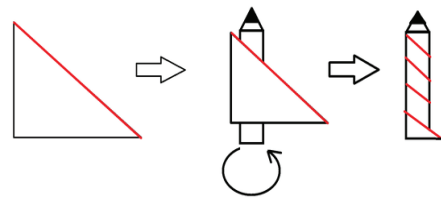
Acharya: Observe the nail. Look at the sharp edge of it. It is two inclined planes which have come together. So it is a wedge. The sewing needle is also an example of a wedge.

Lalitha: What is a screw? Is that also a simple machine acharya?

Acharya: Yes, it is. Look at the surface of the screw.

Mano: It has windings.

Acharya: Let us take a triangular piece of paper, see that it is a right-angle triangle. Now try to wind this piece of paper on a pencil. Look at how I do, and do it the same way. Observe how it appears now?



Screw – a modified inclined plane

Naveen: It looks like windings on a screw.

Acharya: Good! A screw is thus a modified inclined plane.

Think about...
What is a right-angled triangle?

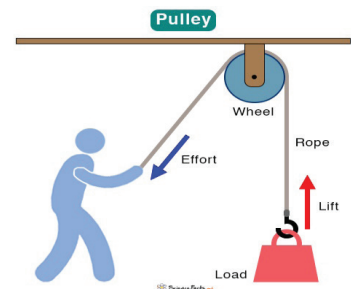
Nishant: Now I understand why it is easier to inter connect two objects using a screw or a nail.

Pulley is also an example of simple machine. Pulleys are wheels with a groove along their circumference. A rope can run along their groove.

When effort is applied in one direction, the load moves in the other direction.

Have you seen how water is drawn from a well in villages?

Jaya: Yes acharya. They have a pulley fixed in a rod above the well. An empty pot is dropped in the well with the help of a pulley. After the pot is filled with water, a downward force is applied on the rope that runs through the groove of the pulley. This pulls the pot of water up.



Acharya: The pot of water is the load that we lift and the effort is the pulling of the rope. Since we have one pulley fixed, it is called a single fixed pulley. Such pulleys are also used to hoist flags. We also have multiple pulleys, which you will learn as you go to higher classes.

Dear children, do you know that some complex machines like cars also have simple machines as their parts.



pulley on a flag post



Ram: It's interesting to know that cars have simple machines. Please tell us more.

Acharya: Have you observed how a car changes its direction?

Ram: When the steering of a car is turned, the wheels of the car change direction accordingly.

Acharya: How does it happen?

Ram: Probably they are interconnected.

Acharya: You are right. This arrangement is called a wheel and axle. You have a wheel which is connected to another wheel with a rod. The rod is called the axle. Thus, this simple machine is called the wheel and axle. The steering wheel is attached to the wheel of the car by an axle. Hence when the steering wheel is operated the wheel of the car changes direction accordingly.

The screw driver that we use to loosen or tighten a screw is a wheel and axle. The instrument acts as an axle. Our hand and the screw acts as two wheels that move in synchrony, as we move the axle.



Acharya: Now that you are aware that simple machines make our life easier, identify the simple machines in your day-to-day life and make a list of them.

ACTIVITY

List few simple machines that make our life easy.



Ponder

Is door knob a simple machine?
Identify its type and label the parts.



SUMMARY

- The first simple machine was made by chipping a flint to make a hand axe and then, our ancestors moved on to make an inclined plane to roll and move heavy objects with less effort.
- Simple machines make work easier. Some of the simple machines are inclined plane the lever, wheel and axle, pulley and screw.
- A machine uses lesser energy to complete a task. When the energy that is used is just mechanical energy, and the number of moving parts are few or nothing, the machine is called a simple machine.
- One group of simple machines is called the lever. A lever has a fulcrum, load and effort.
- There are three types of lever namely First-Class Lever, Second Class Lever and Third Class Lever, based on where the load and effort are located with respect to the fulcrum.
- In First class lever the fulcrum is in the middle of the effort and the load. Eg. Scissors. In Second class lever the load is in between the fulcrum and the effort. Eg. nut cracker. In Third class lever the effort is in between the fulcrum and the load. Eg. Fishing rod.
- Ramp is an example of a simple machine, called the inclined plane. When two inclined planes combine it becomes a wedge. eg.: an iron nail. A screw is a modified inclined plane.
- Pulleys are wheels with a groove along their circumference. If they are fixed on a rod or a surface, they are called fixed pulleys. We use pulleys to draw water from a well or to hoist a flag.
- Wheel and axle is a simple machine that has two wheels connected by a rod. eg.: Steering of a car attached to its wheels and a screw driver.
- Complex machines like cars have many simple machines as their parts.



I. Fill in the Blanks

1. To roll and move heavy objects with less effort a _____ is used.
2. A machine uses _____ to complete a task.
3. The fixed point on a lever, about which the lever moves is called the _____.
4. Levers in which the load is between the fulcrum and the effort belong to the _____.



5. The ramp is an example of a simple machine, called the _____.
6. Two inclined planes combine to form a _____.
7. Machines where one pulley is fixed is called a _____.
8. Scissors is an example of _____ order lever.
9. Complex machines have _____ machines as their parts.
10. The screw driver that we use to loosen or tighten a screw is a _____.

II. Look at the picture to identify the order of the lever and label the fulcrum, load and effort, if it is a lever.

1)



2)



3)



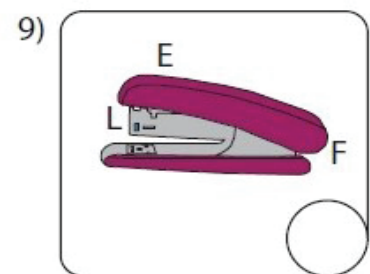
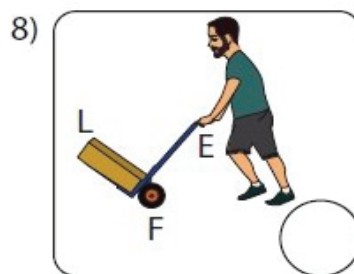
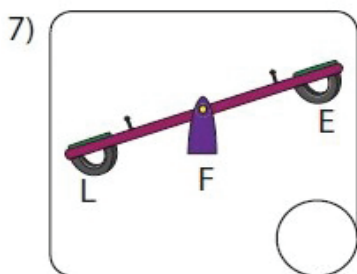
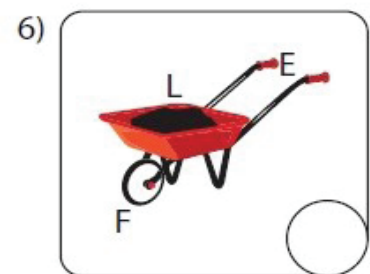
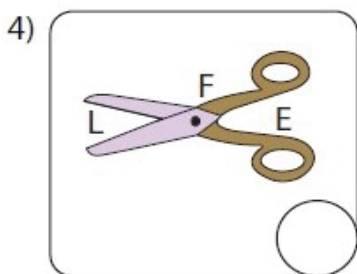
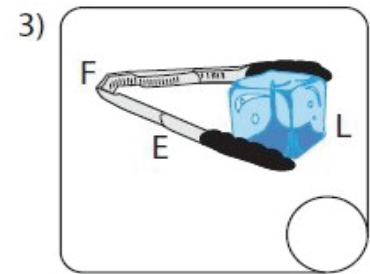
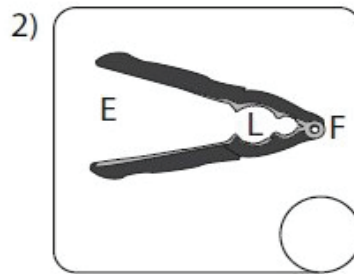
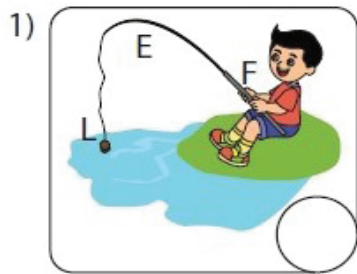
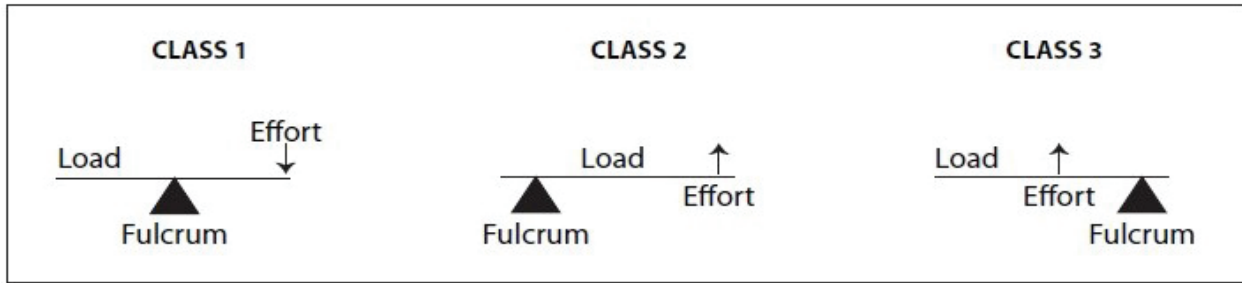
4)



5)



III. Look at each picture and write if it belongs to class 1, class 2, or class 3 based on the position of load, effort, and fulcrum.



IV. Name the Following

- The order of lever where the load is between the fulcrum and effort
- Simple machine that helps lift heavy weight eg. bricks, when building the top floors of a tall house.
- Give two examples of
 - first order lever
 - inclined plane
 - third order lever



- d) Simple machines used in steering wheel of cars.
- e) Modified inclined plane

V. Choose the right option

1. The fixed point on a lever, about which the lever moves.
a) Fulcrum b) Effort c) load d) hinge
2. Levers in which the load is between the fulcrum and the effort
a) Third order levers b) Second order levers c) first order lever
d) zeroth order levers
3. The part between the fulcrum and the load
a) Effort arm b) load arm c) Both a and b d) None of the above
4. Combination of 2 inclined planes
a) ramp b) simple machine c)wedge d) plank
5. Inclined plane is
a) Screw b) ramp c) Nail d) Both a and b
6. Pliers, water pumps, scissors belong to
a) Third order levers b) Second order Levers c) First order levers
d) Fourth order levers
7. First simple machine
a) wheel b) pulley c) scissors d) axe
8. Object on which a machine is used
a) Fulcrum b) load c) effort d) object

VI. Answer the Following Questions

1. What is a wedge? State some uses of wedges.
2. "Scissors are a first order lever." Give a reason for the statement.
3. How does a pulley work? Why is it a simple machine?
4. Describe the three orders of lever with a neat labelled diagram.
5. Why is it easier to fix two pieces of wood together using a screw rather than a nail?
6. From your experience, identify the use of wheel and axle in any one application. Describe how it is useful in it.
7. What is a lever? Explain its components.
8. How does a screw driver work?
9. How does a pulley help draw water from a well ?



VII. Activity



The above arrangement is called a gear.

Have you seen this arrangement in any of the machines?

Clue: Ask your parents/grandparents if they have an analog watch. Think how the hands of the watch move in synchrony. Can there be a gear arrangement in it? Ponder.

VIII. Creative corner

1. Draw a diagram to show that a screw driver is a wedge.
2. Think and draw a diagram to show how a screwdriver can be used as a first order lever.



TERM 2 – SAMPLE PAPER

Max Marks : 80

Time : 2 hours

I Fill in the blanks: (5 x 1 = 5)

1. The liquid waste from industries that are let into water bodies are called Birds are water proof due to the presence of _____.
2. The scientist who discovered Penicillin is _____.
3. Wheel barrow is an example of _____ lever.
4. The ocean that is named after our country is _____
5. Liquids that do not mix with each other thoroughly are called _____ liquids.

II Match the following: (6 x ½ = 3)

6	Aryabhatta		Afforestation
7	Laika		Battery
8	Light Energy		First Living being to space
9	Chemical Energy		Direct contact
10	Consumers		First Indian satellite
11	Growing trees		Sunlight
			Heterotrophs

III Choose the correct answer: (4 x 1 = 4)

12. The viscosity of liquid.
- a) Increases with Increase in temperature
 - b) Decreases with increase in temperature
 - c) Decreases with decrease in temperature
 - d) Remains constant regardless of any change in the temperature
13. The Tehri Dam plant in Uttarakhand is the largest _____ plant in India
- a) Nuclear power
 - b) Hydroelectric power
 - c) Thermal power
 - d) Geothermal power
14. Object on which a machine is used
- a) Fulcrum
 - b) Load
 - c) Effort
 - d) Lever
15. The Frigid Zone lies near the
- a) Poles
 - b) Equator
 - c) Tropic of cancer
 - d) Tropic of capricorn



IV Give two examples for the following:

(3 x 1 = 3)

16. Perching birds
17. Potential Energy
18. Third order lever

V Observe the following pattern and write the answer:

(3 x 1 = 3)

19. 0 degrees latitude: _____ :: 0 degrees longitude : Prime Meridian.
20. Cholera : Bacteria :: Measles : _____.
21. Sloth : Arboreal :: _____ : Aerial

VI Correct the underlined words and rewrite the sentences:

(5 x 1 = 5)

22. Moon is a luminous body.
23. Obesity is a condition that is caused due to genetic disorder, which results in uncontrolled bleeding.
24. Plants prepare their food with the help of carbon dioxide that is present in the leaves.
25. Material is the amount of matter present in a substance.
26. Shadows always form on the same direction of the source of light

VII Name the following:

(5 x 1 = 5)

27. India was the first Asian nation to launch this mission.
28. The long-term weather pattern in an area.
29. Athlete's foot disease is caused by this pathogen.
30. This zone has extremely cold climate, even during summers.
31. The only organisms that are known as producers or autotrophs.

VIII Answer in short :

(7 x 2 = 14)

32. What is displacement? Explain with an example.
33. What is blood transfusion?



34.



- a) Identify the plant shown in the above picture
- b) Why do these plants feed on insects?

35. Susi makes ORS solution. Write the solute and solvent in the mixture.

36. Explain the terms Rotation and Revolution

37. a) Define a machine

b) Draw an inclined plane.

38. Explain symbiosis with an example.

IX Answer in brief:

(6 x 3 = 18)

39. Force can change the speed or direction of a moving object. Substantiate

40. Observe the following picture and write your observations.



- a) Identify the sea given in the above picture. Why it is called so?
- b) Where is it located?

41. Sitara has circular or ring like rashes on her arms, legs and her back.

- a) Name the disease and the pathogen that has caused this disease that Sitara has got.
- b) How does the disease spread from one person to another?
- c) How can we prevent these diseases?

42. Distinguish between arteries and veins.

43. Write any three things to be followed when there is an earthquake.



44. Observe and name the given simple machine. Explain how it works



X Answer in detail:

(4 x 4 = 16)

45. Explain solar eclipse with a neat labelled diagram

46.



- a) Mention the habitat of the above given animal
- b) Explain any three adaptive features of the given animal with reasons

47. a) What are pathogens? Give two examples.

b) Define Immunity. How does it help us to fight diseases?

Describe the different components of blood and their functions.

XI Mark the following on the political map of India:

(4 x 1 = 4)

48. The state where the largest oil well is located

49. The state where the Venus flytrap is found

50. The state where the oldest oilfield is located

51. The state where the Sundew is found



Political map of India

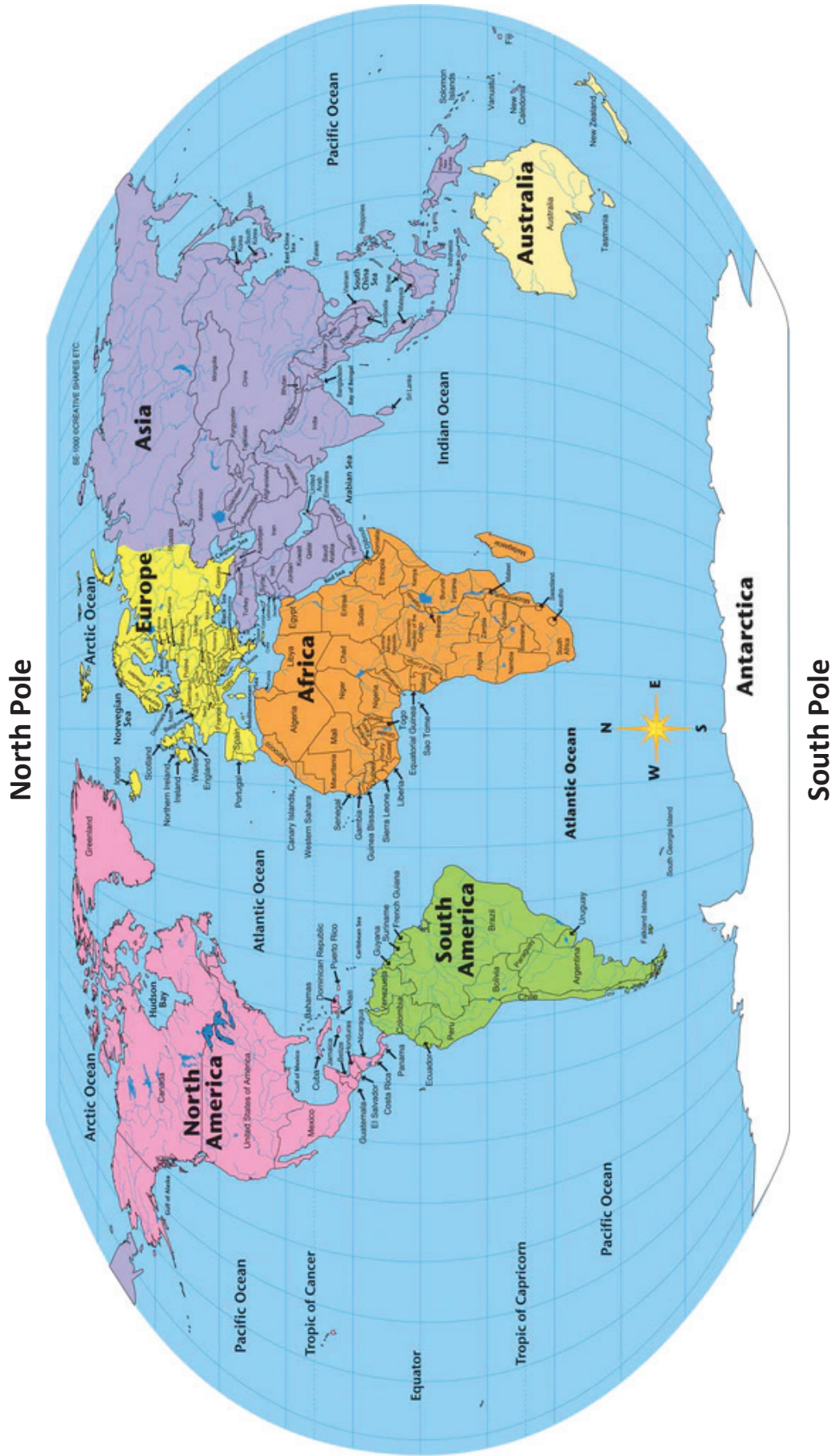


Rivers of India map





World map – Continents and Oceans





अयं निजः परो वेति गणना लघुचेतसाम्।
उदारचरितानां तु वसुधैव कुटुम्बकम्॥

This is mine, that is his, say the narrow minded
The wise believe that the entire world is a family.

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