VASUDHAIVA KUTUMBAKAM - V

We, Our World

ENVIRONMENTAL STUDIES

PART 1

NAME _____

SCHOOL _____

Vasudhaiva Kutumbakam

– We, Our World

EVS – TERM I

‘Vasudhaiva Kutumbakam

– We, Our World’

Second Edition published in 2024

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MRP ₹ 200/-

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.

 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 is the first edition of the book and 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 भूमि पुत्रोहं पृथिव्याः |

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

Chennai | May 2024

Secretary
TN Arya Samaj Edu. Society

Acknowledgements

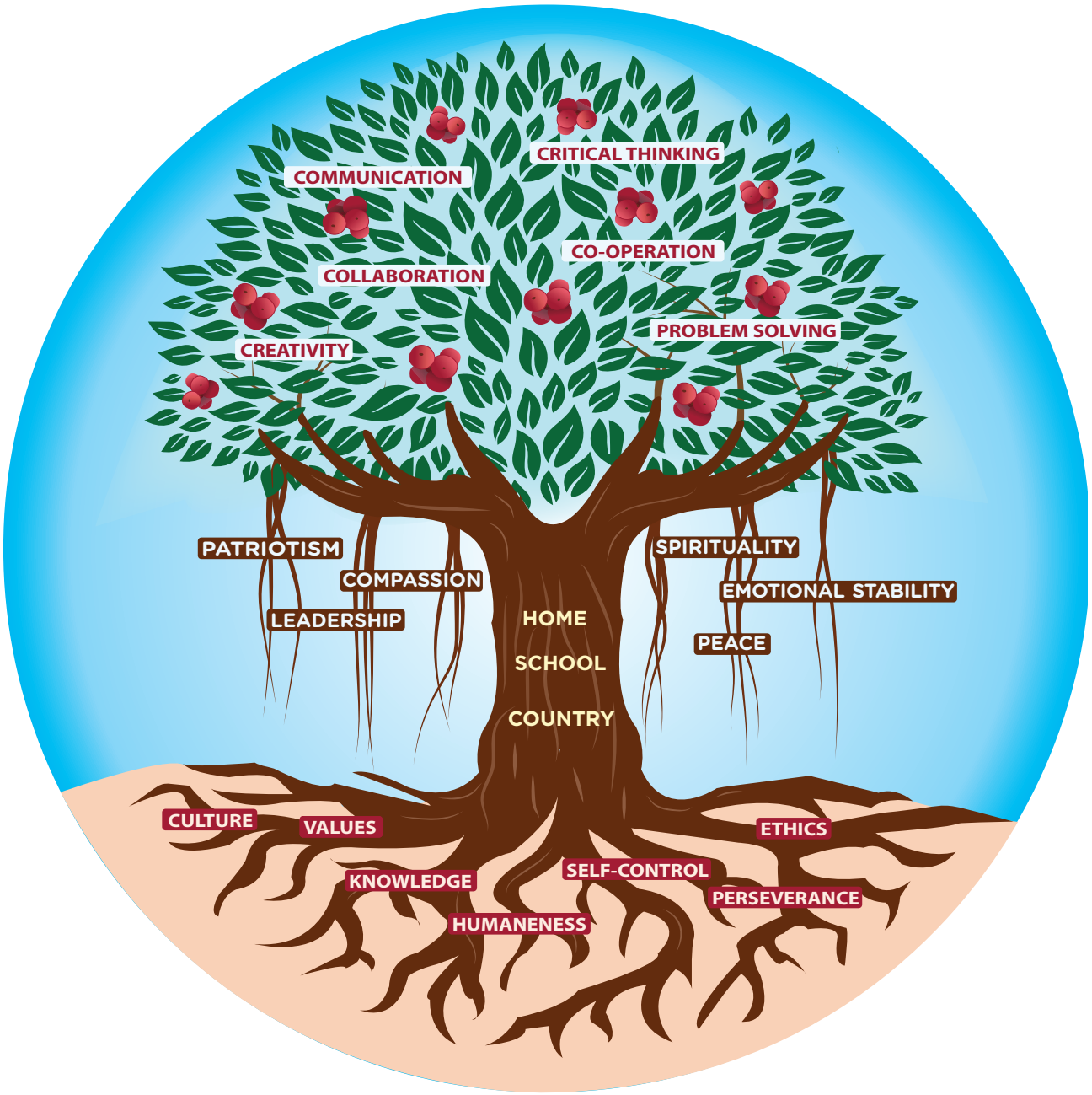
Content Developers/Editors

Smt. Dr. V. Padma Former Dean, Academic Research.
Smt. Swarna Karpagavalli Prabhakaran M.Sc., B.Ed.
Smt. S. Meenakshi B.Sc., M.A., B.Ed.
Smt. K. N. Chitra M.A., M.Phil., B.Ed.
Smt. V. Anita M.Sc., M.Ed.
Smt. Hema Srinivasan B.Sc., B.Ed
Smt. Mani Mala Ravichandran B.Sc, B.Ed., M.C.A., M.Phil.
Smt. P. Padmapriya B.Sc., M.Ed.
Smt. Sasikala Ramesh BBA, (M.Sc.,), B.Ed.
Smt. T. R. Shuba B.Tech.
Smt. T. Sowmya B.Sc., MCA, B.Ed.
Smt. C. Sruthi Laya B.Sc., B.Ed.
Smt. B. Thara M.Sc., B.Ed.
Smt. Usha Ravi B.Sc., M.A., B.Ed.
Smt. S. Usha B.Sc., MBA, M.Ed.
Smt. A.R. Vanitha B.Sc., Ed.
Smt. Vibha Roy M.Sc., B.Ed.

Editing and Technical Support

Smt. Jagatha S. B.Com., B. LIS., PGDCA
Smt. Judy Nagarajan M.Sc., B.Ed., Director, Acad, Admin & HR, Swami Dayananda Matric Hr. Sec. School, Tiruvarur.
Smt. Sarada Devi Ravutu M.A. (His), M.Phil., M.A. (Eng), B.Ed.
Shri. Deepak Raaj A. R.

The Learning Tree



Contents

Healthy Living 1

Expected Learning Outcomes

Students...

know the foods that are rich in protein, iron, iodine and calcium roughage**,** the natural sources of vitamin A, B, C, and D, the diseases caused by deficiency of vitamins and minerals.

know about the need for outdoor activity, the requisites to lead a healthy life

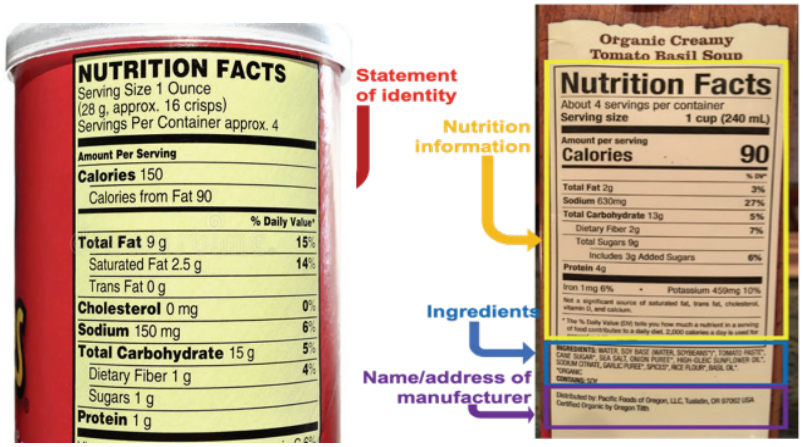
know the meaning of pandemic, anaemia, roughage, osteoporosis, lipids

understand the advantages of consuming sprouts, the need for consumption of foods rich in iron, calcium and iodine, the effects of dehydration, **the role of** two types of roughage, **why** scurvy was known as sailor's disease, playing in sunlight is important, to **correlate** the symptoms of the disease to the deficiency of the respective minerals and vitamins, **how** ORS is prepared and its purpose, **the role of** carbohydrates, proteins, fats, vitamins, minerals, water and roughage in food

understand the importance of vitamins, proteins, roughage in food, brushing of our teeth twice a day.

appreciate the need to consume sufficient quantity of water

Setting the TONE



Give your food a **3G** connection with **F**ree **W**ifi

Go foods – carbohydrates, fats – energy giving

Grow foods – proteins – helps in growing and healing

Glow foods – Vitamins and minerals – keeps us healthy

Water and **F**ibre – for proper functioning of body and to remove waste

Sheetal: Ma (mother in Hindi), when will bua (father's sister in Hindi) arrive?

Mother: She will be home tomorrow afternoon. You will get to meet her, when you return from school.

Sheetal: I am over the moon and can't wait to see her.

Next day in School...

Sheetal: Rashmi, I am waiting for the final bell of the day to go home.

Rashmi: Why, what's special today? You always stay back after school hours to play.

Sheetal: Today my bua is coming from Kanpur after three years. She will be staying with us for a week. Please come home to meet her. It would be interesting.

Rashmi: Why has she not visited you for the last three years?

FACT FILE

A **pandemic** is when a large number of people or animals are suffering from a disease at the same time. The disease also spreads across a large region, for instance multiple continents or worldwide, affecting a substantial number of individuals.

Sheetal: My bua is a doctor. She like any other doctor was busy due to the pandemic. Though we were worried about her safety, my grandparents were proud that she was helping people in times of need.

Rashmi: That should have been a tense period for all of you. It is a relief to know that we are almost out of it. I would like to meet your bua.

Sheetal gets into the school bus excitedly and is off to home. As she rings the doorbell, bua opens the door for her. Sheetal touches bua's feet to take her blessings.

Bua: Sheetal, you have grown taller! I am happy to see you bubbling with energy. Stay healthy always.

Sheetal: Thank you bua. I am very happy to see you. We were very scared about your safety, though you kept reassuring us that you were taking all precautions.

Bua: Thank you for all the prayers. One should always remember that a balanced diet, adequate exercise and healthy relaxation for the mind and body would definitely keep you fit. You have to follow hygiene practices to protect yourself from infectious diseases.

Sheetal: I shall refresh and be back to spend the evening with you. I have lots of doubts regarding healthy living which I can get clarified with your help.

Sheetal joins her bua, mama and papa for the evening snack.

Sheetal: Mama, what have you made for snack today?

Mama: It's garnished sprouted channa.

Sheetal: Mama is always fond of sprouted beans of different kinds. She tries to make me eat them at least twice a week. It's quite boring.

Mama: They are rich in proteins and are good for health.

Bua: Your mama is right Sheetal. Beans, pulses, milk, paneer, cheese are rich in proteins. Proteins are essential for growth and also for the repair of damaged tissues in our body.

Milk

Pulses

Paneer

Sheetal: Repair of damaged tissues?

Bua: Yes, we hurt ourselves some times. When we fall sick, the tissues undergo some damage. Proteins are essential to set these right. As soon as I saw you today, what did I say?

Sheetal: (Happily) I have grown tall.

Bua: Children need more proteins than adults because proteins are essential for their growth and also for the repair of damaged tissues.

Sheetal: Do the foods that you mentioned as protein rich contain only proteins?

Bua: That's a doubt that many have. When we say that something is rich in protein, it means that it has proteins in large quantities and other nutrients in small amounts. Very rarely we find a food that has only one kind of nutrient.

Sprouts

Sheetal: But bua, why is mama sprouting the beans every time she makes sundal out of it?

Bua: Mama is trying to make it more nutritious. When the seeds sprout, a large amount of vitamins and minerals are released, to help the baby plant grow well. These nutrients that are released during sprouting are good for us too. So sprouted beans are enriched with nutrients.

Sheetal: That's interesting. I will try to eat them without grumbling.

Mama: Are you going out to play or would you like to join us for a walk in the park Sheetal?

Sheetal: Today I will join you for a walk as I love talking to bua.

Bua: Do you play every day Sheetal?

Sheetal: Yes bua. I love to play. My mama and papa have made it compulsory for me to spend time outdoors everyday, that too playing games during which I expend a lot of my energy.

Bua: That's a great way to build physical and mental strength.

TASK

Do you play everyday? If so, what games do you play and when? Discuss.

Sheetal: You seem to be connecting everything with health bua.

Bua: What you do every day becomes your lifestyle. It is very important to maintain a healthy life style.

You play outdoors say, you play a game of basketball or volleyball or even run and catch with your friend. How do you feel after a game?

Kids playing basketball

Sheetal: I am happy when my team wins. I am sad when we lose. I have a lot of friends on the ground. Some of my teammates help me with my homework too.

Bua: You are right. Playing games helps us build a healthy relationship with our teammates, our peers. We also become more empathetic and are ready to help others.

When we gasp and run, our lung capacity increases and our heart becomes stronger. The muscles of our hands and legs also gain strength when we play.

Sheetal: Wait, wait bua, you used a lot of new terms now, vitamins, minerals, etc. Tell me more.

Bua (laughing): Sorry Sheetal, I didn't give you time to take in what I was saying. Let me begin with telling you a few of facts on vitamins.

Sheetal (interrupting): First what are vitamins?

Bua: Vitamins are nutrients that are required by our body in small quantities. Though

they are required only in small quantities, even a small shortfall can lead to diseases. Such diseases are called **deficiency** diseases.

Sheetal: That's interesting. Please tell me more bua.

Bua: Let's go in order. Vitamin A helps in the prevention of night blindness and to maintain healthy skin.

Sheetal: What is night blindness bua?

Bua: Inability to adjust to dim light is called **night blindness.** In case of night blindness, we would not be able to see in dim light. Green leafy vegetables, yellow coloured fruits and vegetables like carrot, pumpkin, mango are rich in vitamin A.

Foods rich in vitamin A

Green leafy vegetables

Carrots

Pumpkin

Mango

Vitamin B is necessary to maintain a healthy nervous system, for release of energy in our body and transporting oxygen.

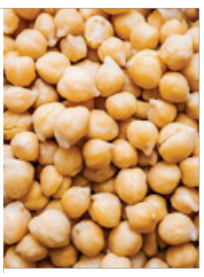
Deficiency of vitamin B, leads to a disease called **beri beri.** Common symptoms of beri beri are weakness of muscles, frequent illness, skin diseases, and fatigue.

A variety of food such as cabbage, spinach, chick peas, kidney beans, bananas, whole grains are rich in vitamin B.

Foods rich in vitamin B

Cabbage

Spinach



Chick peas

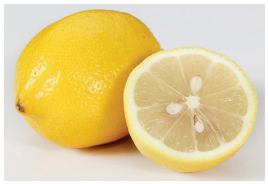
Kidney beans

Whole grains

Vitamin C is important to prevent infections and for healing wounds. It helps in the absorption of iron. Deficiency of vitamin C leads to scurvy.

Symptoms of scurvy include bleeding gums, hair loss and fatigue. Deficiency of vitamin C can also lead to anaemia.

Foods rich in vitamin C



Lemon

Bell peppers

Tomatoes

Cabbage

Broccoli

Indian gooseberry (Amla)

Oranges

Cauliflower

Our body when exposed to sunlight can synthesise vitamin D. Thus, vitamin D is known as the sunshine vitamin. Vitamin D is essential to help the body absorb calcium.

Deficiency of vitamin D can lead to soft and brittle bones and muscle pain. The best way to prevent its deficiency is to expose oneself to sunlight. Foods like butter, ghee, milk, curd also contain some amount of vitamin D.

Foods rich in vitamin D

Ghee

Milk

Curd

Butter

Vitamin E is required for healthy skin and hair. Vitamin K helps the blood to clot when there is a bleeding injury.

Vitamins	Deficiency Disease	Symptoms	Can be prevented by consuming
Vitamin A	Night blindness	• Poor vision • Loss of vision in darkness	Green leafy vegetables, yellow coloured fruits and vegetables like carrot, pumpkin, mango
Vitamin B	Beri beri	• Numbness in the arms and legs • Swelling in the hands and feet	Cabbage, spinach, chick peas, kidney beans, bananas, whole grains
Vitamin C	Scurvy	• Bleeding gums • Wounds take a long time to heal	Citrus fruits (orange, lemon), bell peppers, Indian gooseberry (amla), tomatoes, green leafy vegetables, cabbage, cauliflower, coriander
Vitamin D	Rickets	• Bones become soft • Muscle pain	Exposure to sunlight, butter, ghee, milk, curd

Sheetal: Shall we go home? I have some homework to complete.

Bua: Definitely dear. We shall go. We can continue our discussion at our dinner table.

TASK

List all food items that you eat regularly and the nutrients they contain.

They return home. Sheetal freshens up and completes her homework. She arranges her bag for the following day at school and is almost ready for dinner, her papa also returns from office. Let's join them at the dinner table.

Sheetal: Papa, today bua told me a lot about proteins, vitamins and also about the need to exercise regularly. I think I know a lot about healthy living now.

Papa: I am happy about it Sheetal. The most important part is you need to follow them regularly. Can we have dinner? Let me set the table.

Bua: Sheetal, do you know how a healthy eating plate needs to be filled?

Sheetal: How bua?

Bua: Let me show it to you by a diagram.

Bua draws a diagram of a plate and fills in the foods in the required quantities

Sheetal: (Looking at the diagram) Bua, you draw so well! You mean to say that we need to eat a lot of fruits and vegetables and less of grains.

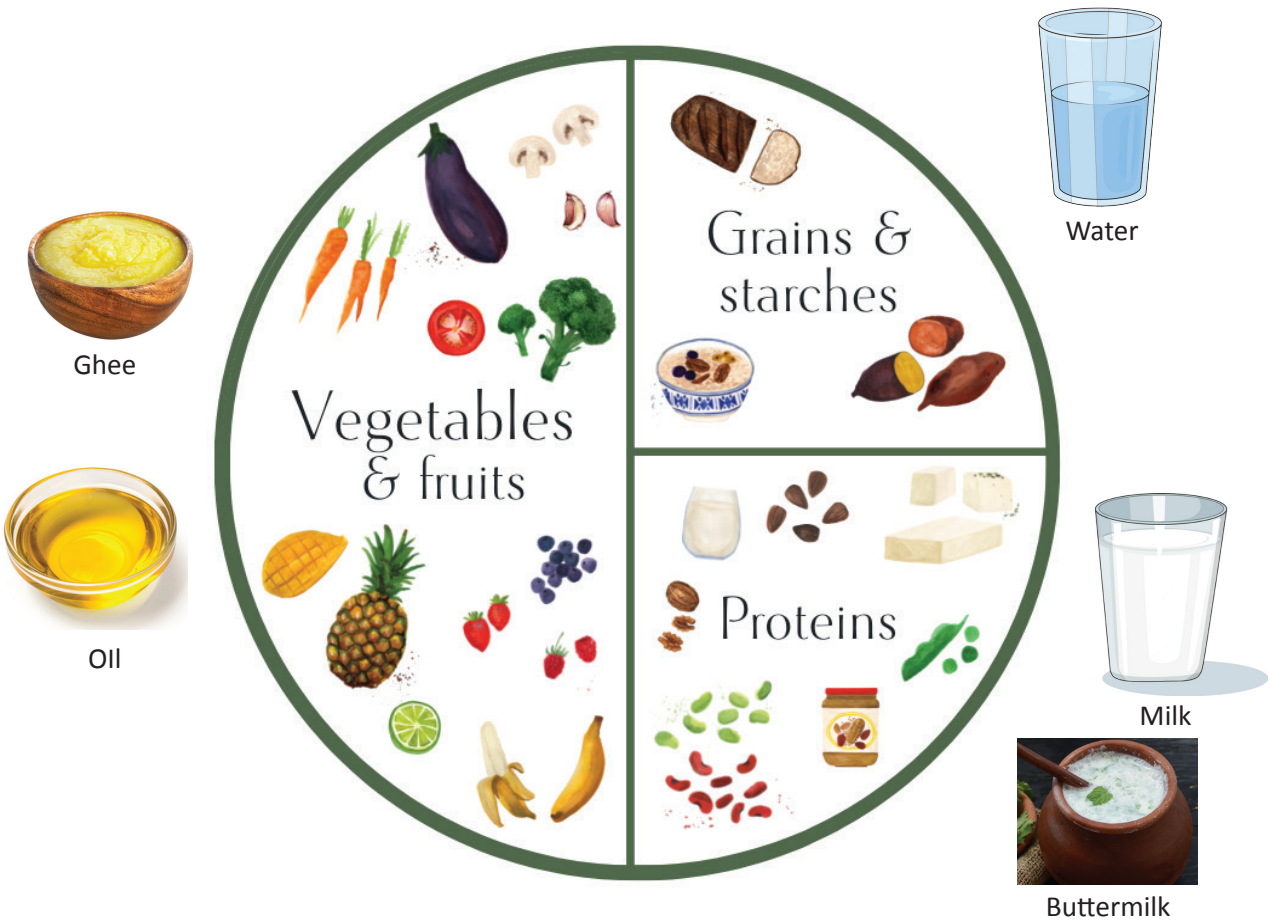


Diagram of a healthy diet plate

Bua: Yes Sheetal. Fruits and vegetables contain not only vitamins but also minerals and roughage.

Sheetal: What are they bua?

Bua: Vitamins are organic in nature, i.e., they are obtained from living things, while minerals can be obtained from both organic and inorganic sources. For example, we can obtain iron by cooking food in iron utensils. Minerals are substances that are required in small quantities by our body to remain healthy.

Sheetal: That's interesting.

Bua: Some important minerals required by our body are iron, calcium and iodine. Iron

as you know, is required for healthy blood. It helps in the formation of haemoglobin in our blood. Haemoglobin is responsible for carrying oxygen to all the cells of our body. Deficiency of iron can lead to anaemia.

Sheetal: I have heard of anaemia. One of my friends has anaemia.

Bua: It's very common, especially among adult and adolescent women. Green leafy vegetables are rich in iron. It is also important to eat a protein rich food and foods rich in vitamin C like Indian gooseberry (amla), and oranges to help in absorption of iron. Symptoms of anaemia include fatigue, loss of hair, pale skin and eyes.

Foods rich in iron

Pomegranate

Dates

Raisins

Pulses

Drumstick Leaves

Kidney Beans

Soyabeans

Almonds

Iodine is another common mineral required for proper functioning of thyroid gland. Deficiency of iodine leads to a disease called **goitre**. Major symptom of goitre is swelling at the base of neck. Iodine is added to table salt to prevent its deficiency. Calcium is known as the growth mineral that helps us to grow as it helps us maintain healthy bones and teeth. Together with magnesium, it keeps our muscles healthy. Deficiency of calcium can lead to brittle bones.

Some calcium rich foods are milk and milk products, green leafy vegetables and fruits like guava. Vitamin D and adequate physical activity are required for absorption for calcium by bones.

Foods rich in calcium

Almonds

Soyabeans

Milk

Peas

Green leafy vegetables

Sheetal: Bua, you mentioned another name, roughage!

Bua: Roughage, also known as dietary fibre, is essential to maintain a healthy digestive system and lipid levels. Roughage is of two kinds, soluble and insoluble. To make you understand this better let me ask you a question. How will you feel, if you do not complete your morning chores on time?

Sheetal: That is a very uncomfortable feeling bua. We don't want to discuss it with anyone. But, on days I am not able to relieve myself I feel extremely irritated.

Bua: If your food does not have enough roughage, it is difficult for our body to get rid of its solid wastes. Wastes are generated when we process something. When our body processes the food that we eat, some wastes are formed which have to be removed in the form of urine or faeces.

Roughage in our food helps in the removal of solid wastes from our body. Roughage is the indigestible part of our food. Food rich in roughage are pulses, fruits and vegetables.

Foods rich in roughage


Vegetables & Fruits


Whole Grains


Pulses

Sheetal: You told me about two kinds of roughage bua?

Bua: Roughage can be soluble and insoluble. Insoluble roughage helps in the removal of solid wastes, while soluble roughage helps in the removal of bad fats from our body. You will learn more about them as you grow older.

Sheetal: My mama also says that I need to drink at least 3 to 4 litres of water every day. Does it provide any vitamin or mineral?

Enrichment

Homemade oral rehydration solution can be prepared by dissolving:
6 teaspoons of sugar and half a teaspoon of salt in 1 litre of boiled and cooled water

Bua (laughing): No. Like roughage, water too does not provide any nutrients. But is essential for our healthy living.

Water helps to

1. maintain our body temperature

2. digest food

3. transport and absorb nutrients

4. remove wastes from our body

Organs can stop functioning, if one gets dehydrated. Sufficient water is required for normal functioning of all organs of the body. If we get dehydrated due to some reason, we need to replenish the lost minerals and water by taking Oral Rehydration Solution (ORS).

Enrichment

What is ORS?

Oral rehydration solution (ORS) is administered to those who suffer from dehydration. It helps them to regain water and vital salts.

Sheetal: How proud I am of you! I want to be like you one day bua.

Bua: Thank you Sheetal. Have a good night's sleep, we shall continue our discussion tomorrow.

FACT FILE

History of ORS in India

In 1971, during the Bangladesh war, the refugees fled East Bengal (now Bangladesh) came to West Bengal and were housed in refugee camps. There was an outbreak of cholera happened among the refugees. Cholera is a disease that leads to dehydration caused due to diarrhoea. To replenish the lost fluids and minerals Dr. Dilip Mahalanabis who was working on cholera control for World Health Organisation administered a simple and inexpensive oral rehydration solution which helped the refugees recoup, get hydrated and recover from the illness. Thus Dr. Dilip Mahalanabis was the pioneer of ORS in India.

Sheetal and her bua have a good night's sleep, they get up early next morning. Sheetal is so inspired by her bua that she wants to learn more and starts her questioning right away.

Sheetal: Bua, why should I brush my teeth every day?

Bua: It is important to brush your teeth twice a day, once in the morning and once at night. When we sleep, our mouth goes dry. The bacteria that live in our mouth multiply several times at night. So we need to brush our teeth in the morning to reduce their number.

When we go to bed at night, we need to brush to remove any food particle that might be remaining between our teeth, because bacteria can thrive on those too.

We also need to gargle our mouth immediately after eating anything to remove food particles sticking to our teeth. If we do not do that it may lead to cavities in teeth, which can be very painful. Sometimes, it can lead to loss of teeth also.

Bua and Sheetal are at the breakfast table. Papa had prepared a delicious breakfast. They are ready to have the radish and cauliflower paratha with curd.

Sheetal: Now I will tell you bua, radish and cauliflower have vitamins B and C. Cauliflower is rich in calcium. They are also rich in fibre. Curd has vitamin D, calcium and protein.

Bua: You left the wheat flour that is used to make parathas. You also left out the oil/ ghee that is used to make it.

Sheetal: But what do they contain?

Bua: Grains like wheat, rice and millets contain carbohydrates. They are the "Energy giving food". They provide us with energy for all our chores and also to our body parts to carry on their functions. Fats also provide us with energy. The energy provided by fats is twice that of the energy provided by carbohydrates. Fats are also required for transportation and absorption of vitamins.

Sheetal: How I wish I can spend some more time with you bua!.

Bua: Don't worry dear, we will have more discussions on prevention of diseases in the evening.

Sheetal: My friend Rashmi will also join me in the evening to ask you more questions to understand healthy living better. Shall I take leave now bua?

Sheetal leaves for school in her auto rickshaw.

SUMMARY

- A balanced diet, adequate exercise, proper hygiene and healthy relaxation for the mind and body will keep us fit.
- Proteins are essential for growth and repair of damaged tissues in the body.
- Vitamins and minerals are required in small quantities but any deficiency could lead to what is called deficiency diseases.
- Carbohydrates and fats are energy giving foods.
- When the seeds sprout, a large amount of vitamins and minerals are released to help the baby plant to grow well.
- Playing outside in open spaces exposes us to sunlight and gives us Vitamin D.
- Roughage or dietary fibre is essential for the removal of solid wastes and bad fats from our body.
- Water does not provide any nutrients but is essential for digestion, absorption of nutrients, removal of wastes and maintaining body temperature
- ORS – oral rehydration solution helps to replenish the lost minerals and water.

Let's do

I Fill in the Blanks:

1. Damaged tissues are repaired by the nutrient _____.
2. The inability to adjust to dim light is _____ and is due to the deficiency of _____
3. Oxygen is carried to all the cells of our body by _____
4. Deficiency of iron will lead to _____
5. The component of food that helps to maintain body temperature is _____

II Name the following:

1. The sunshine vitamin
2. The vitamin essential for healthy nervous system
3. Two protein rich foods
4. The mineral required for healthy bones and teeth

III Observe the pattern and fill in the blanks:

1. Night blindness : Poor Vision :: Scurvy : _____
2. Healthy skin and hair : Vitamin E :: Helps blood to clot : _____
3. Insoluble roughage : _____ :: Soluble roughage : Removal of bad fats
4. Vitamin A: Carrots :: _____ : Citrus Fruits

IV. Give two examples for food rich in:

1. Vitamin A
2. Vitamin B
3. Vitamin C
4. Vitamin D
5. Iron
6. Calcium

V Match the following:

Vitamins/Minerals	Deficiency diseases
1. Vitamin C	Goitre
2. Vitamin B	Scurvy
3. Vitamin D	Anaemia
4. Vitamin A	Rickets
5. Iron	Night blindness
6. Iodine	Beri beri

III Say True or false:

1. We need to eat a lot of fruits and vegetables and less of grains and pulses.
2. Minerals can be obtained from both organic and inorganic sources.
3. Soluble roughage helps to remove solid wastes.
4. The energy provided by carbohydrates is twice that of energy provided by fats.

IV Answer the following:

1. How can we stay fit?
2. Explain the importance of playing outdoor games.
3. What are deficiency diseases?
4. Why should we consume lots of fruits and vegetables?
5. Lata is diagnosed with anaemia,
   i. What might be her symptoms?
   ii. What types of food would you recommend? Why?
6. What makes sprouted beans rich in nutrients?
7. Give a diagrammatic representation of a healthy diet plate.
8. Why should we drink at least 3-4 litres of water every day?
9. It is important to brush our teeth twice a day. Justify.
10. Why are grains like rice and millets called energy giving foods?
11. What is ORS? How do you prepare it at home?

Plant Life 2

Expected Learning Outcomes

Students...

know the names of few plants whose seeds are dispersed by wind, water, animals and explosion, that some plants reproduce with the help of their vegetative parts.

know about the various modes of seed dispersal, the vegetative parts of a plant

understand the need for seed dispersal, the features of seeds that help in dispersal through a particular medium, the various ways of vegetative propagation.

make an effort to raise a garden at home/school

Setting the TONE

THE BANYAN TREE

A verse from Panchatantra about Banyan Tree:

Deer recline in its shade;
Birds in scores gather to roost
Darkening its canopy of dark-green leaves;
Troops of monkeys climb on the trunk;
While hollows hum with insect-legions
Flowers are boldly brushed by honey-bees;
O! What bliss its every limb showers
An assemblage of various creatures;
Such a tree deserves all praise.

The Banyan tree

Anand and his friends were chasing a puffy, silky, white material that looked like an insect in their school playground. The children thought that it resembled the beard of their grandfather and called it the grandfather insect. One of them managed to catch hold of it and on looking closer they realised that it was not an insect. They had an intense discussion over what it could be. Since they were not able to identify it, they decided to take it to the class to know what it was from their acharya. Let us stand by their class to know what that could be...

Children together in an excited tone, pointed towards their catch and said "Acharya, today during the P.T period, we had a different kind of run and catch game. We chased this white object for long and finally managed to get it. We realised that it was entirely different from all that we have seen earlier. What is it acharya?"

Dandelion seed

Acharya: This is a seed of dandelion. We see it floating in air every year during this season. You may also see a few more in the coming days.

Arun: A seed floating! That sounds interesting. Why is it floating acharya? Will it start growing in the air itself?

Acharya: That's an interesting imagination, Arun. The seeds are being dispersed. When it falls on suitable soil and if other conditions are also conducive, the seed will start growing into a new plant

FACT FILE

The roots of dandelion are used to make a drink, similar to coffee. The leaves are used to flavour sandwiches, tea and salads too. The flowers have mild pain relieving properties.

Bala: Dispersal! Like how we disperse in the evening from school?

Acharya: When something moves from one place to different places around, it is called dispersal. In this case the seeds are dispersed from the mother plant to faraway places.

Vikram: Why should seeds move away from the mother plant? Would they not be comfortable near the mother plant?

Acharya: To know the answer to your question, let us take a closer look at the plants. Let us go to the school garden.

The acharya along with the children reach the school garden.

Acharya: Now let us observe the lady's finger that has grown in large numbers. Shall we open one to understand how many seeds are there in it? Has anyone counted?

Ranjit: Acharya, there would be a large number of seeds. How do we count them?

Raman: My English teacher said that some nouns are uncountable. We cannot count the seeds acharya.

Acharya: What does it mean? It means that there are a large number of seeds. Imagine all the seeds fall near the mother plant, and grow as young plants near the mother plant itself, what would happen?

Raman: There would be a large number of them near the mother plant itself.

Acharya: True. In such circumstances there would not be enough space for each one of them. They all need the same kind of nutrients from the soil. They would also not get enough of nutrients. Further when they crowd around the mother plant they would not get enough of water and sunlight too. So, the seeds disperse to far of places to grow.

Plants are wilting due to overcrowding

Vinod: How sensible nature is. Seeds disperse or move away from the mother plant so that the young ones get enough space, nutrients, water and sunlight to grow. But how do they get dispersed?

Acharya: There are different modes of dispersal of seeds. The dandelion seed that you all saw now is dispersed by wind. Observe the seed, it is light and can easily float in air. It has hair like structures on its body. When the seed falls on the ground, it develops into a new plant. Some seeds that are dispersed by wind have wing like structures, which help them float through air. Examples of plants that disperse their seeds with the help of wind are milk weed and maple.

Subana: I have seen that all seeds are not light enough to be carried by wind. How do they disperse?

Acharya: Seeds get dispersed with the help of water, animals and by explosion.

Vinod: Explosion? How?

Acharya: The seeds of peas, beans, are in pods. When the seeds are mature enough the pod bursts open and the seeds are scattered all around. Thus, they get dispersed. They grow into a new plant, when the other conditions are conducive. Seeds of lady's finger disperse by the method of explosion.

Lady's finger seeds

Akash: But what happens to seeds that are large, say the seed of mangoes?

Acharya: Some seeds are dispersed by animals. When we eat mangoes and throw their seeds on the soil, they grow into a new plant. Have you seen neem and peepal trees growing on the walls of buildings?

Akash: I always wonder how the seeds reached the walls of buildings.

FACT FILE

Flying foxes or fruit bats love mangoes and are important for dispersal of their seeds.

Acharya: Birds eat the fruits of these trees. The seeds cannot be digested by the birds. Hence, they come out along with their droppings. When these fall on a suitable place sometimes a crevice on a wall they grow into a new plant.

Some seeds like beggar-ticks, sandbur and blueberry have hooks or spines on their body. They hook on to the animal's body that comes close to it and travel to distant places. When they fall to the ground, they grow into a new plant. Do you know that Velcro was invented, by observing this phenomenon?

Seeds with hooks

Seeds attached to animal fur

FACT FILE

Invention of Velcro

Swiss electrical engineer George De Mestral observed that burs from the burdock plant clung to his clothes, as well as to his dog's fur when they go for a walk to the woods. He found thousands of tiny hooks attached to his everyday clothing. When he examined the burs under a microscope it inspired him to make what we call a velcro which has stiff hooks like the burs on one side and soft loops like the fabric on the other. Thus came the velcro that is now popularly used to bind two surfaces.

Avinash: Its interesting acharya to learn how seeds are dispersed by wind and animals. Do seeds of aquatic plants also get dispersed?

Acharya: Seeds of plants that live in water or those that live close to water bodies get dispersed by water. Seeds of lotus and lily are dispersed by water.

Do you know that coconut is dispersed by water? When coconut ripens and falls into

the sea nearby, it floats till it reaches the coast. It grows into a new plant on the coastline.

Dispersal of coconut by water

Avinash: The coconuts look quite big; how do they float?

Acharya: The husk of the coconut makes it light. It has a lot of air trapped in it. It floats like how we float in water when we wear a rubber tube filled with air around us.

Avinash: Now I understand.

Vinod: Acharya, my garden has a large hibiscus plant. One of my father's friends wanted a hibiscus plant like ours. My father cut a stem from our plant, planted it in the soil, nurtured it for a few days. He gave the new plant to his friend. How is that acharya? I thought that all plants reproduce with the help of seeds.

Acharya: Good Vinod. You have observed an important phenomenon and raised it in the class. Many of the flowering plants reproduce with the help of seeds. However, some flowering and non-flowering plants reproduce with the help of their vegetative parts also.

Vinod: (interrupting): Acharya… Flowering plants are those that produce flowers; non-flowering plants are those that do not produce flowers, but what do you mean by vegetative parts?

Reproduction through stem cutting

Acharya (Smiling): Don't worry. I shall explain. In most of the flowering plants, the flowers grow into fruits that have seeds in it. They reproduce with the help of seeds. So, flowers are called the reproductive part of the plant. The other parts of the plant like the root, stem, leaves are vegetative parts.

Vinod: I understood. In hibiscus the stem is the vegetative part that helps in propagation.

Acharya: Very true. Sugarcane is also cultivated by the method of **stem cutting**.

Rose and jasmine can also be propagated by layering. The stem is bent a little and a part of it is placed under the soil. It is carefully nurtured. The part of the stem that has been placed in the soil, gives rise to new roots to become a new plant. It is then cut off from the parent plant. This method is called **layering.**

Layering of Jasmine plant

Akshay: Do leaves and roots also reproduce acharya?

Acharya: Yes, they do in some plants. Sweet potato can reproduce from roots. Take a sweet potato and keep it suspended in a glass of water. You will see new root hair emerging from it. It can grow into a new plant.

Vinod: I love potatoes. How do they reproduce?

Sweet potato

TASK

Find out some more plants that are propagated by layering.

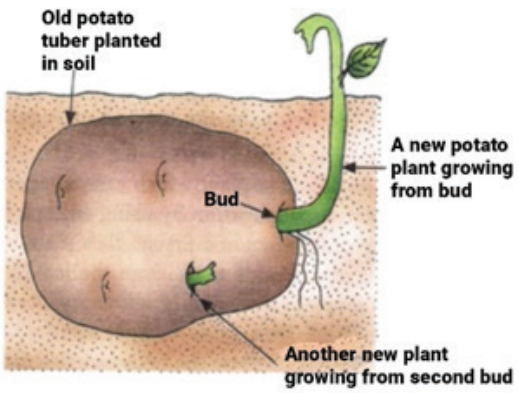
Acharya: Remember, potato is a stem, not a root. It is an underground stem. It reproduces by producing buds on the underground stem.

Potato is one of the most sought after vegetables and hence grown in large quantities, not only in our country, but the world over.

Arun: Are ginger and turmeric also underground stems?

Acharya: Yes, ginger and turmeric are underground stems.

They store food below the ground beyond the reach of herbivorous animals. They are swollen due to the storage of food materials.
Banana also reproduces the same way like ginger and turmeric.



Arvind: I have seen how a turmeric grows.

My mother buys them in January when they are available aplenty in the market. We see small buds sprouting from them in July. She places them under the soil, with the bud slightly above the soil. In a few days, leaves come out of it.

Ginger

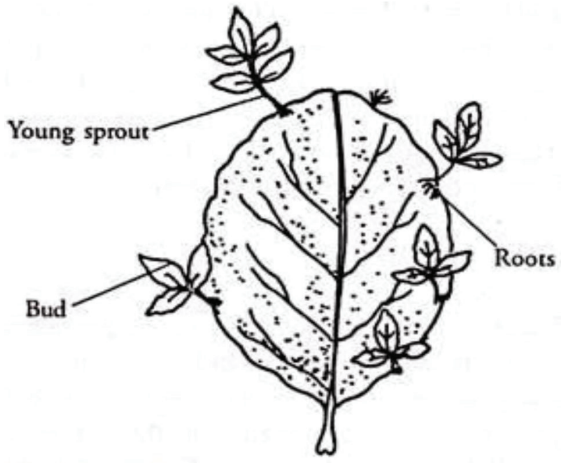
Turmeric

I am planning to try this with ginger too.

Acharya: Thank you for the detailed input Arvind. It was a good observation.

Vinod: Do leaves also reproduce Acharya?

Acharya: Have you heard of bryophyllum? Bryophyllum is a plant that reproduces with the help of leaves. You can see small leaflets arising on the border of the leaf. They start growing small roots at the bottom; it falls to the ground and grows into a new plant. When plants are multiplied with the help of vegetative parts like root, stem and leaves it is called **vegetative propagation.** We shall learn a lot more about plants in our next class.



Bryophyllum leaf

Akash: I have understood that plants can reproduce even through leaves, stem and roots. It was great learning experience today. Thank you.

SUMMARY

- The transportation of seeds from the mother plant to faraway places so that the young ones get enough space, nutrients, water and sunlight to grow is called as seed dispersal
- Seeds get dispersed by different agents like wind, water, explosion and with the help of animals.
- Flowers are the reproductive parts of a plant. Roots, stem and leaves are the vegetative parts.
- When plants multiply with the help of vegetative parts like roots, stems and leaves, it is called as vegetative propagation.
- Vegetative propagation through stem is enabled in the process of stem cutting and layering.
- The vegetative propagation of potato is from the stem. It reproduces by producing buds.
- Bryophyllum is a plant that reproduces with the help of leaves.

Let's do

I. Fill in the blanks:

1. Coconut floats in water because its _____ is light.
2. Seeds like beggar-ticks have _____ that sticks to the animal's body.
3. When seeds are carried away from one place to another, it is called _____.
4. The reproductive part of a plant is its _____.
5. Sweet potatoes can reproduce from _____.
6. Turmeric is available aplenty in the month of _____.

II. Give examples for the following:

1. Seeds dispersed by
   a. Water - _____, _____
   b. Wind - _____, _____
   c. Animals- _____, _____
   d. Explosion- _____, _____

2. Plant that reproduces by
   a. Layering- _____
   b. Stem Cutting- _____
   c. Root- _____
   d. Leaves- _____

III. Sort the seeds according to their mode of dispersal:

Dandelion, Milkweed, Sandbur, Lotus, Lady's finger, Beggar tick, Peepal, Maple, Peas, Coconut, Neem, Lily

wind	water	animals	explosion

IV. Answer the following

1. What is meant by seed dispersal? Why do seeds disperse?
2. What are the characteristics of seeds which are dispersed by wind?
3. Explain how layering is done. Name the plants for which it is used.
4. Briefly explain the process of reproduction in bryophyllum.
5. Define vegetative propagation. What are the vegetative parts of the plant?
6. How do potato plants reproduce?
7. Amit wants to start a kitchen garden, he starts with turmeric. Help him with the steps to grow turmeric.

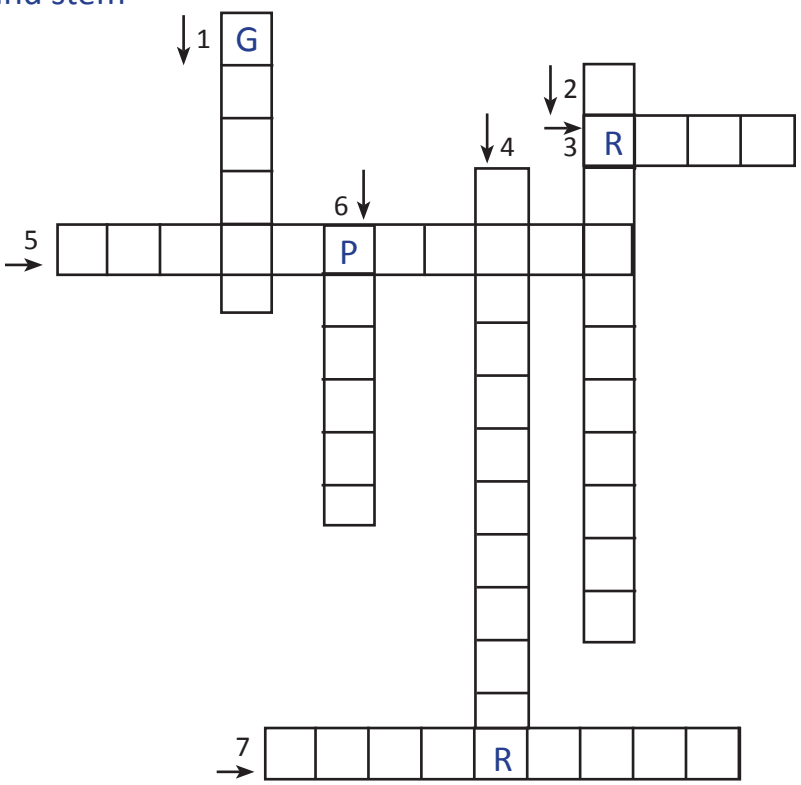
VI Solve the puzzle

ACROSS

3. Reproduces by the method of layering
5. Propagates vegetatively through root
7. Grown by stem cutting

DOWN

1. An example of rhizome
2. New plants develop from leaflets
4. Dispersed by water
6. An underground stem



VII Activity corner

i) Try growing mint in your kitchen garden.

a) List the steps involved in the process. Record your observations.

ii) Take some mustard or fenugreek seeds and sow them in a pot. Sprinkle water regularly. Observe the changes once in two days and record your observations in your notebook.

iii) Ayesha found some extra growth on the potatoes in her vegetable basket which was left for a long time.

a) What could those be?

b) Such sprouted potatoes are not edible. Why?

iv) Sketch your favourite cartoon character and make a seed mosaic of it, using seeds from your mom's kitchen.

VIII Think, pen down and share: Most of the inventions that have made our life easy have been an outcome of our observation of nature. Find out about one such invention (other than velcro) and share it in your class.

Start a journal to enter observations that you think are significant. Discuss about these with your teacher once a month.

Bharat – Chhatrapati Shivaji 3

Expected Learning Outcomes

Students...

know the extent and period of Marata empire, the historic monuments – Shivneri fort, Pratapgarh fort

know about early life of Chhatrapati Shivaji, Shivaji's guru – Dadaji Konda Deva, Shivaji's challenges – Afzal Khan, Sultans, the administration of Marata kingdom, Marata navy (frigates), **know the meaning of** (a) Chhatrapati, (b) guerrilla warfare, (c) CSMT, (d) Ashta Pradhan and (e) bichawa, waghnakh weapons

understand how Shivaji became a Chhatrapati, the reasons that led to the fall of the Sultans and the rise of the Marata empire, the valour, grit and strength of character of men & women of the past, **why** the Sultan of Bijapur worried about Shivaji, **how Shivaji** was moulded from his early days to create an empire and defeated the Sultan's army in the Battle of Kolhapur, built his navy, planned to attack / kill Afzal Khan

analyse Shivaji as a Chhatrapati, **how** the strategies adopted by the Marata empire stopped the progress of the Mughal empire and led to its decline

appreciate Shivaji's strategy in establishing the Marata empire, the valour and glory of the Maratas

Setting the TONE

Sambar is a popular south Indian dish. During the Marata rule in Thanjavur, Tamil Nadu, they brought with them their culinary traditions, including the use of tamarind and spices in cooking. It is believed that sambar was first served to Sambhaji, the son of Shivaji, during his visit to Thanjavur. Slowly this entered into the cuisine of Tamil Nadu leading to the development of a unique style of sambar. Today, it is one of the signature dishes of this region.

Madhu, Niharika and their ajji (grandmother in Kannada) are at CSMT-Mumbai to travel to Pune.

Chhatrapati Sivaji Maharaj Terminal in Mumbai

Madhu: The railway station is so big! Is this Mumbai Central?

Ajji: This is one of the biggest railway stations in India. It is called CSMT.

Niharika: CSMT, does it stand for something ajji?

Chhatrapati Sivaji

Ajji: Yes. It is Chhatrapati Shivaji Maharaj Terminus.

Madhu: Chhatrapati Shivaji Maharaj, the name sounds very familiar. But, I don't know much about him. Can you tell us ajji?

Ajji: Sure. It is always a pleasure to talk about great men. Let's board the train first. We have enough time to talk before we alight at Pune.

They get into the train and settle down.

Niharika: Ajji, please tell us about him. We always love to hear from you.

Ajji: Chhatrapati Shivaji was one of the greatest leaders in the history of Bharat. This station in Mumbai is named after him because he was born in Maharashtra.

Shivneri Fort

Shivaji with his mother

Madhu: In this city?

Ajji: No. He was born in Shivneri fort in Pune.

Madhu: He was born in a fort? Was his father a king too?

Ajji: Shivaji's father, Shahji Bhonsle was one of the nobles, who helped the king of Ahmad Nagar administer his kingdom. His mother was Jijabai. Shivaji and his

FACT FILE

Tutelage is the act of providing guardianship, that is protection and also guiding to acquire necessary skills for future.

mother Jijabai had to live away from his father during his younger days, as his father was too busy in the King's court. However, Shahji Bhonsle assigned an officer, Dadaji Konda Deva to train him in the art of warfare and administration. His mother was a great influence as she instilled in him qualities such as determination, courage, the spirit to fight against injustice, tolerance towards fellow men and spirituality.

Niharika: That's interesting ajji. But how did he gain his kingdom? I thought his father was a king.

Ajji: Shivaji did not want to work under the Moghul kings who were ruling the country then. He wanted to create an independent kingdom, right from a very young age, because of the influence of his mother. When he was 6 years old, he refused to bow before the Sultan of Bijapur, breaking the court traditions, thus puting his life at risk.

Even as he was under the tutelage of Dadaji Konda Deva, he captured the hill forts near Pune.

Shivaji fought against Mohammed Adil Shah, the Sultan of Bijapur and captured many forts that were under him. The Sultan imprisoned Shivaji's father Shahji Bhonsle. This led to the slowing down of Shivaji's plan for expansion.

To quell the threat posed by Shivaji and his army, Adil Shah sent his trusted General Afzal Khan. Afzal Khan had a large army of men. It also included 100 canons, 90 elephants and over 1000 camels. Shivaji had a much smaller army. Shivaji knew that he and his men would face defeat if he took them up in an open battle field. Hence, he decided to use guerilla warfare tactics and nullify the supremacy of Afzal's army masterminding the attack from a fortress.

Madhu: What is guerilla warfare ajji?

Ajji: "Guerilla" (Ganimi Kava in Marati) is a warfare technique which involves surprise, sudden and quick attacks on the enemy, when they least expect it.

Niharika: It's very interesting ajji. Tell me more about what happened.

Ajji: Afzal Khan wanted Shivaji to come out of the fortress. Hence, he started destroying the temples at Pandharpur and Tuljapur. Shivaji knew what Afzal Khan's plans were and did not lose his cool. In fact, the Hindu chieftains from the region led by Kanhoji Jedhe started supporting Shivaji.

So, it was like a stalemate in the game of chess. Afzal Khan understood that Shivaji was a strategist and hence can be captured only by deception.

He sent his men as emissaries to invite Shivaji for talks. However, Shivaji understood the plan behind this and suggested that they meet only near the Pratapgarh fort. It was

decided that only Shivaji and Afzal Khan would meet without arms and their armed men would stay away from the place of meeting.

Shivaji was prepared for deception. He wore an armour under his clothes, a helmet under his turban and also carried a waghnakh (tiger claw) in his fist and a thin dagger called bichawa. His trusted bodyguards Jiva Mahala and Sambhaji Kavji were with him.

Pratapgarh Fort

Waghnakh (tiger claw)

Bichawa

Children, before we go further I would suggest you have some snacks and water.

Madhu: Please don't stop in between ajji. It's so interesting.

Ajji: True. When Afzal Khan and Shivaji met, they proceeded for a customary embrace. Afzal Khan was a huge man compared to Shivaji. He tightened his grip on Shivaji and tried to stab him. Shivaji's armour saved him.

Niharika: Thank God.

Ajji: Shivaji pushed Afzal Khan away. He attacked Afzal Khan with his waghnakh and bichawa. Both men rushed out of the tent. Shivaji ordered his forces that were placed strategically to attack the forces of Afzal Khan. Their training in guerilla warfare and good knowledge of the terrain helped the Marata forces win their enemy.

Shivaji's army continued their attack and took over 23 of the Sultanate's forts and expanded the Marata kingdom. The Sultan's army led by Rustam Zaman was defeated by the Marata army, in the battle of Kolhapur. The two victories, made the Mughal emperor Aurangazeb realise the power and the unity of Maratas. He spent most of his time trying to keep the Maratas at bay.

Madhu: Ajji, you have not told us when Shivaji became Chhatrapati.

Ajji: In 1674, Shivaji's coronation was held. Vishweshwar, a renowned Pandit of Banaras

performed the ceremony according to Vedic rites. He assumed the title "Chhatrapati", as he wanted to be a protector of his subjects rather than a King. Raigarh was his capital.

Battle of Kolhapur

Niharika: That's about his military valour ajji. How was Shivaji as a ruler?

Ajji: He was a good human being. He never destroyed the places of worship of other religions, nor did he disrespect their scriptures. He treated women and children with dignity irrespective of their religion.

Frigates (light warships with oars)

Shivaji was the commander-in-chief of his army. He had an excellent system of espionage. This provided him with all vital information regarding his enemies and the other important happenings, which a king needs to know. His army consisted of men from all faiths. He involved himself personally in the training of his army men. Shivaji also had a good navy. He had huge warships and hundreds of frigates (light warships with oars). He was able to control the coast line because of this.

He was also the seat of authority of the judicial system.

Though he was all powerful in the Marata kingdom, he used his powers only for the welfare of his subjects. He introduced Marati as the state-language and appointed a committee to prepare a dictionary in Marati.

He was assisted by eight ministers known as "ashta pradhan". The chief among them was known as the "Peshwa". His kingdom was divided into 3 provinces to help in administration. Each province was headed by a Governor.

Madhu: How inspiring his life is!!

Ajji: True children. He possessed kindness, tolerance, courage, chivalry, determination and worked with good intentions. He was a king worthy of emulation for his subjects and the younger generations.

Niharika: What a great leader ajji! How long did he live?

Enrichment

Espionage is the practice of spying by Governments to obtain political and military information about another country, generally when the country is not friendly.

Ajji: He lived for about 52 years. He breathed his last on 3rd April, 1680. However, he has left behind a legacy of good administration and leadership.

Madhu: I think we have reached Pune. Waiting to hear about the lives of many more great men ajji.

FACT FILE

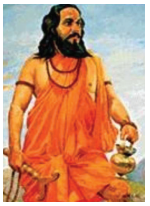
Ashta Pradhan

Chhatrapati Shivaji appointed a council of eight ministers to guide the administration of his state. Each of the ministers was placed in-charge of an administrative department.

They were independently in charge of the departments and had to report to the king. The Peshwa was the chief amongst them, but others did not have to report to him.

Enrichment

Swami Samarth Ramdas, a great saint was the spiritual Guru of Chhatrapati Shivaji. He was a prolific writer who contributed to Marati literature. His works helped in building nationalism though they were steeped in spirituality



SUMMARY

- Shivaji was born to Shahji Bhonsle and Jijabai in Shivneri fort in Pune
- He learnt the art of warfare and administration from Dadaji Konda Deva
- He captured many hill forts near Pune, fought against Mohammed Adil Shah, Sultan of Bijapur in order to expand his kingdom.
- Shivaji had smaller army compared to Afzal Khan. But he used guerilla warfare tactics (surprise, sudden and quick attacks on the enemy, when they least expect it) to nullify the supremacy of Afzal's army.
- Shivaji expanded the Marata kingdom by taking nearly 23 of Sultanates forts.
- The training of Maratha soldiers in guerilla warfare, knowledge on the terrain, the power and unity of Marathas helped them win over their enemies and kept the Mughals at Bay.
- In 1674 Shivaji was coronated as "Chhatrapati"(protector of his subjects rather than a king)
- Shivaji had an excellent system of espionage(spying to obtain military and political information about another country), trained his army men in guerilla tactics and had a good navy(with huge warships and frigates)
- Shivaji administered the kingdom with eight ministers ("Ashta Pradhan"). His Kingdom was divided into 3 provinces with each province headed by the Governor.
- He lived for about 52 years and breathed his last on 13th April 1680. He left behind a legacy of good administration and leadership.

Let's do

I State True or False:

1. Shivaji was born in Purandhar fort.
2. From a young age, Shivaji aspired to establish an independent kingdom.
3. Chhatrapati Shivaji Maharaj Terminal (CSMT) is in Calcutta.
4. Adil Shah sent his general Afzal Khan to suppress the threat of Shivaji and the Marata Army.
5. Maratas adopted guerilla warfare.

II Name the following:

1. The capital of Marata kingdom-
2. The council of ministers in Shivaji's court-
3. Light warships with oars -
4. The warfare the Maratas were excellent at -
5. The state language of the Marata kingdom -

III Answer the following:

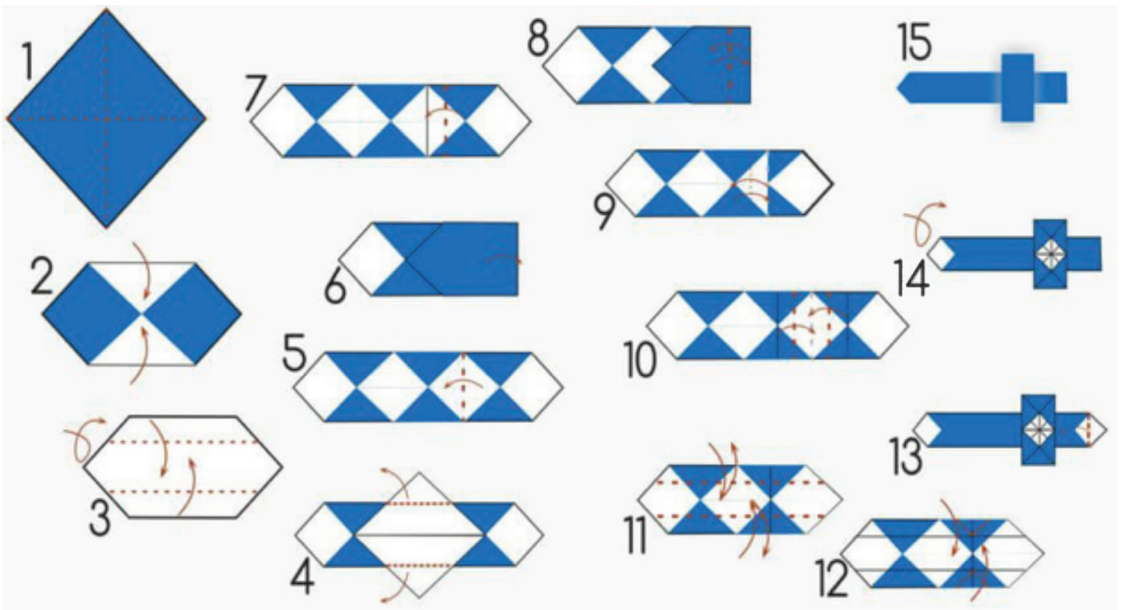
1. Write a short note on the early life of Shivaji.
2. Describe the rise of Shivaji as a warrior.
3. What is guerilla warfare?
4. How did Afzal Khan plan to capture Shivaji?
5. What were the different military strategies used by Shivaji to strengthen his army?

IV Arts Integrated Learning:

1) Collect pictures of Indian warships, make a collage and write few lines about them.

2) Role play: Choose a person from Shivaji's life who has inspired him and enact his/ her role in the theatre class.

3) Try making the paper sword using origami paper



Travel 4

Expected Learning Outcomes

Students...

know the sources of information on ancient civilisations, that "Artha Sastra" and "Charaka Samhita" hold good in modern times, who the first Governor General of Independent India was, what CE and BCE are with reference to time periods

know the meaning of archaeology, edutainment, a port town, tributary, Lothal, Mangalyaan.

know about the mission of UNESCO, the role of women in Salt Satyagraha.

understand the purpose of studying archaeological remains, the layout of Lothal from its remains, the importance of River Sabarmati in our freedom movement, the need for "Salt Satyagraha", **why** Harrappan civilisation was named so.

Setting the TONE

Identify the places

Jaisalmer Fort in Rajasthan

Gwalior fort in Madhya Pradesh

Kangra fort in Himachal Pradesh

Golconda fort in Telangana

Anokhi and Vaibhav are studying in a school in Ahmedabad. The school has planned a one-day trip to Lothal. They are so excited about it and want to know a little more about the place, before they leave for the trip.

As they pack the snacks for the tour, they enter into a conversation with each other and their parents.

Lothal, port town of Indus Valley Civilisation

Vaibhav: Mata (mother in Gujarati) I am so happy that I am going with my friends on an excursion tomorrow. It's going to be wonderful playing, singing and dancing with Vinatha, Himal, Joshil and Nanku.

Think about...

Name the places that you visited recently. Discuss their historical importance.

Mata: I am very happy for you Vaibhav. Travelling with friends is always a wonderful experience. It's nice if we can use these trips as edutainment and not just entertainment.

Anokhi: What is edutainment mata?

Mata: It's education and entertainment. You enjoy yourself, as you learn too. That way what you learn also leaves a lasting impact in your mind.

Vaibhav: Sure mata! That is a great way to learn. I remember well, if I learn the fun way. But what is interesting about Lothal?

Anokhi: Vaibhav, our teacher said that it is an UNESCO world heritage site. What is UNESCO?

Enrichment

Archaeology: A study of how early men lived based on the objects they used, artefacts they made, houses they built, clothing they used, religion they practiced and so on.

Vaibhav: I know UNESCO stands for **United Nations Educational, Scientific and Cultural Organisation**. She told us that the mission of UNESCO was to play an active role in developing quality support system and promote collaboration in the fields of education, science and culture among the nations.

Mata: You have understood it right. It was formed in 1945 for the objectives mentioned by Vaibhav. Now, coming to your question, Lothal is a port-town of the Indus-Valley Civilisation.

Anokhi: What is a port-town mata?

Mata: A port is a docking place for ships on the coast of an ocean, a river or a lake.

The city close to it is called a port-town. Cochin, Kandla, Bhavnagar, Chennai are a few port-towns in India.

Vaibhav: Oh! That's interesting. My teacher said that Lothal has the remains of the Indus Valley Civilisation. From what you said I understand people who lived during the period of Indus Valley Civilisation knew shipping. Am I right mata?

Mata: Good! You are asking questions. Lothal has the archaeological remains of the port-town Lothal.

Anokhi: What do you mean by archaeological remains?

Mata: **Archaeological** remains are the remnants of materials and buildings that have been destroyed due to vagaries in nature and passage of time. The remains of Lothal are suggestive of walls as thick as 12-21 metres along the coast designed to withstand the tidal flood.

Inside the thick-walled fortress, Lothal had wide streets, drains and rows of bathing platforms. The remains suggest that the city was well-planned.

Remains of Lothal

The remains also suggest the presence of a bead-making factory, warehouse, stone anchors, marine shells and seals.

Vaibhav: This is so interesting mata. When did this civilisation flourish in Lothal?

Mata: The evidences suggest that the civilisation thrived from 2400 BCE to 1600 BCE.

Anokhi: It is dated so back in time. How do we know about life of people who lived in ancient times?

Enrichment

CE – COMMON ERA.

The Common Era is counting of the years according to the Gregorian calendar that is followed internationally in present days.

The period that is before Common Era is Before Common Era (BCE)

Mata: We come to know of our ancient civilisations from the archaeological ruins and buildings. The excavations in these sites give us a lot of information on their jewellery, trade, artefacts and a lot more. These also help us to know the history of that period.
Can you think of other sources from which we understand history?

Anokhi: Mata, I have heard that seals were

FACT FILE

The excavations at Keezhadi, near Madurai in Sivaganga district throw light on an ancient civilisation that thrived on the banks of River Vaigai. It has been established that the settlement belongs to 200 BCE. Around 5300 antiquities have been unearthed from this site till date.

found in Lothal.

Mata: Good! Seals give us historical information. Ancient history is also rebuilt from religious scriptures, epics, and puranas. We have a vast collection of literary work that tell us about how we lived then. But we are not able to chronicle them accurately. So it is a challenge to identify the exact period of many of the happenings of that era. Apart from the religious texts, we also have the literary compositions, biographical works, inscriptions, coins, and monuments that help us understand the past.

Seals of Lothal

Vaibhav: I always thought that history was only about memorising dates and names.

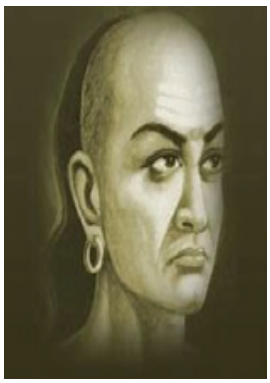
Mata: While it is necessary to know chronology, it is more important to understand the life of those who lived during a particular period. Such knowledge also helps us to make decisions in the present days.

A palm leaf manuscript in Nandinagiri script

Inscription on the walls of Hampi

Inscription on the walls of Brihadeshwara temple, Thanjavur

Chanakya's "Artha Sastra" is even today a good management guide for an individual and an organisation. Our "Charaka Samhita" helps us understand the science of medicine holistically.



Chanakya

Anokhi: Knowing all these makes me proud mata.

Mata: True Anokhi. We should know our history to be confident and to be proud of our motherland, Bharat.

Let's have our dinner. Your pita (father in Gujarati) will join us shortly.

Enrichment

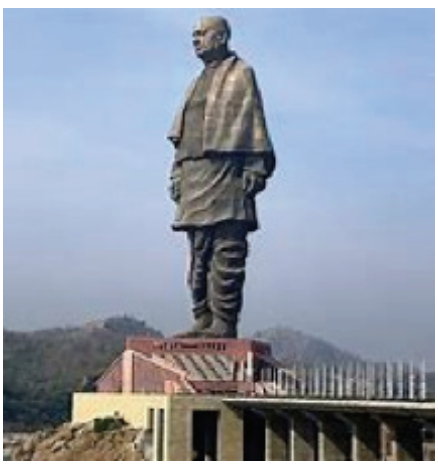
Inscription: Words, drawings, or sculptures carved on a wall or any hard surface.
Chronology: The order in which a series of events happened (from earlier to later).

As they have their dinner the discussion continues.

Vaibhav: Mata, my teacher also told us that we may be visiting the Statue of Unity and the Somnath temple next year.

Mata: The Statue of Unity is the world's tallest statue, with a height of 182 metres (597 feet) of Sardar Vallabhai Patel, who was a nationalist, freedom fighter and statesman, instrumental in uniting the 562 princely states to build the Republic of India.

Vaibhav: A great man indeed! My teacher told Somnath temple is an architectural marvel with fine carvings and sculptures of various Gods and Goddesses.



Statue of Unity

Somnath Temple

Pita enters the house, freshens up and joins the family for dinner.

Pita: I am sure all is set for tomorrow's trip.

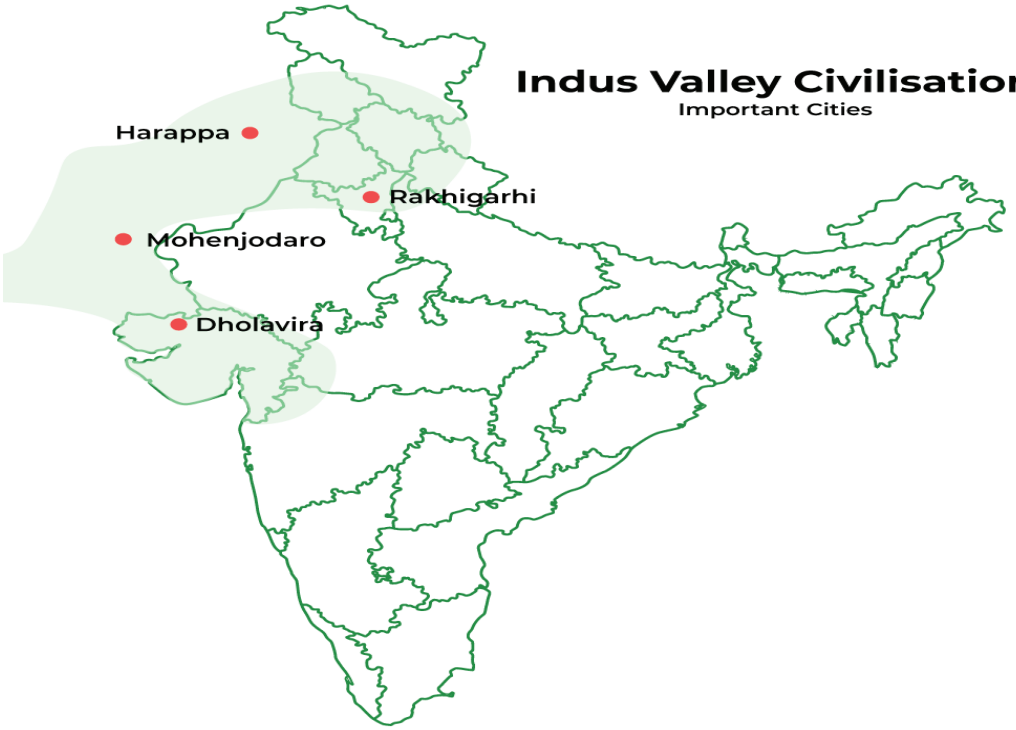
Anokhi: Pita, mata not only packed us snacks, she also packed our heads with knowledge. I am proud of my mata.

Pita: That's nice. Are you aware that Bharat always respects her women?

Anokhi: My teachers repeatedly tell us that we as a nation, treat men and women equally. Our women got the right to vote automatically when India became a democratic nation, while the women in western countries got their right to vote only after a struggle.

Pita: Great! Your teachers are right. Let me listen to what mata had shared with you.

Children share what they have understood from mata about Lothal, Indus Valley Civilisation.



Pita: Children, are you aware where Lothal is?

Vaibhav: It is about 2 hours drive from our school.

Pita (laughing): But tell me its location based on a mountain, river, valley or a gulf near it.

Anokhi: Please tell us pita.

Pita: It is located along the Bhogavo river. Bhogavo is a tributary of River Sabarmati.

Sabarmati Ashram

Vaibhav: What is a tributary?

Anokhi: A tributary is a small river that joins a bigger river. Many large rivers are formed from such tributaries. A tributary generally does not join a sea or ocean directly.

Vaibhav: It's so interesting. In the history club last week one moto bhai (elder brother in Gujarati) spoke why River Sabarmati is an important part of our freedom struggle.

Pita: True. The ashram that Gandhiji established on the banks of Sabarmati, brought

ACTIVITY

Locate river Sabarmati on the map of India.

together people who would be committed to work for Swarajya. It was his home from 1917 to 1930.

It was from here that the "**Salt Satyagraha**" or the "**Dandi march"** was launched with 78 patriots to break the salt law, an important part of our freedom movement.

The British had prohibited Indians from collecting and selling salt. The Salt act of 1882 gave British the sole right to manufacture salt. We Indians had to pay a heavy tax on salt, apart from the huge cost that the British had fixed for it.

Think about...

Find the names of the others who took part in the Dandi March.

Vaibhav: I never knew that there were so many Indians who took part in the freedom struggle. Did the Salt Satyagraha happen in other parts of India too?

FACT FILE

Salt law

Salt was freely available to those living along the coast. The 1882 Salt Act gave the British the sole authority to collect and manufacture salt. The Indians were forced to buy salt from the colonial government. The violation of this act was a criminal offence.

Pita: This non-violent revolt happened in other parts of India like Tamil Nadu, Bihar also. India has a long coastline and many citizens were involved in making salt. So the salt law affected a large population. In Tamil Nadu, it was led by Shri. C. Rajagopalachari. The patriots marched 150 miles from Tiruchirappalli to Vedaranyam, a coastal town as a part of the Salt Satyagraha.

Vaibhav: How many patriots participated in the Vedaranyam march, Pita?

Pita: There were about 100 men participants.

Anokhi: Were there no women participants pita?

Pita: It was a carefully planned march. Men of those days felt it would be difficult for women to march for three weeks.

But women were not deterred. Sarojini Naidu along with Mithuben led the protest at the Dharasana Salt Works in Gujarat.

March to Vedaranyam

Anokhi: That's inspiring pita. My teacher told me that Sarojini Naidu was known as the 'Nightingale of India'. She was a multilinguist as she was well versed in many languages such as Urdu, Telugu,

English, Bengali and Persian. She was the first woman Governor of Uttar Pradesh, India.

Vaibhav: Ha! You know so much!

Sarojini Naidu

Mata: You can also share what you have learnt.

Vaibhav: Rajagopalachari, also known as Rajaji was independent India's first Governor General.

Mata: The short school tour has opened up a lot of discussion and learning. Travelling opens one's horizon of knowledge and thinking. The experiences that we have during our travel will also help us bond with people of different culture.

Anokhi and Vaibhav are excited not only about their school tour the following day. They discuss about it, as they fall asleep.

SUMMARY

- UNESCO stands for United Nations Educational, Scientific and Cultural Organization. The mission of UNESCO is to play an active role in quality support system and promote collaboration in the fields of education, Science and culture among the nations.
- The sources of history such as epics, puranas scriptures, literary composition, coins and monuments help us to understand their way of life and practices during the particular period.
- A port is a docking place for ships on the coast of an ocean, a river or a lake.
- The city close to a port is called a port town. Lothal is the port town of Indus valley civilization.
- Chanakya's "Artha sastra" is a good management guide for both an individual and an organization even today
- "Charaka Samhita" helps us understand the science of medicine holistically.
- The Statue of Unity is located in Gujarat is the world's tallest statue that stands at 182 m. It is dedicated to Sardar Vallabhai Patel.
- Somnath Temple is an architectural marvel with fine carvings and sculptures of various gods and goddesses.
- On the banks of the river Sabarmathi, Gandhiji established an ashram which brought together people who were committed to work for Swarajya and Dandi March was launched from here.
- Salt Satyagraha happened in many parts of India including Tamilnadu.
- Shri.C.Rajagopalachari marched 150 miles from Tiruchirappalli to Vedaranyam.
- Many women patriots participated in Salt Satyagraha. Sarojini Naidu along with Mithuben led the protest at the Dharshana salt works in Gujarat.

Let's do

I Fill in the Blanks:

1. UNESCO stands for _____.
2. Chanakya's _____ is a good management guide for an individual and an organisation.
3. Bhogavo is a tributary of _____.
4. Salt Satyagraha was led by _____ in Tamil Nadu.
5. The patriots of Salt Satyagraha in Tamil Nadu, marched 150 miles from _____ to _____

II Name the Following:

1. A study of how early men lived, artifacts they made, houses they built, clothing they used, religion they practised.
2. A form of entertainment designed to educate as well as to amuse.
3. A docking place for ships.
4. The port town of Indus Valley Civilization.
5. A book that helps us understand science of medicine holistically.

III Choose the Odd One Out:

1. Dandi, Tiruchirappalli, Vedaranyam, Lothal.
2. Religious texts, inscriptions, coins, Manglayaan.
3. Rajaji, Sarojini Naidu, Mithuben, Chanakya.
4. Chennai, Cochin, Kandla, Thanjavur.

IV Match the Following:

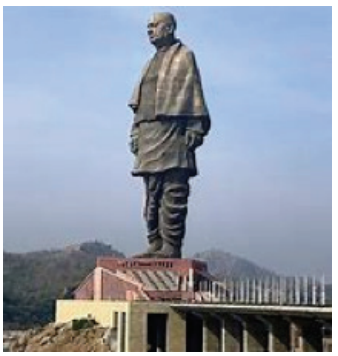
Somnath Temple	Statue Of Unity
Sardar Vallabhai Patel	Artha Sastra
Gandhiji	Architectural Marvel
Salt law	Sabarmati
Chanakya	1882

V) Answer the Following in one or two lines:

1. What is a port town? Name any two port towns of India.
2. How can we rebuild ancient history?
3. What are archaeological remains?
4. What is a tributary? Give an example.
5. Name the two prominent women who participated in Salt Satyagraha.
6. What are the benefits of travelling to new places?

VI) Answer the following in Brief:

1. What are the main objectives of UNESCO?
2. What types of information do we get from the archaeological ruins and buildings?
3. Explain the causes that led to the Salt Satyagraha.
4. Why is Sarojini Naidu called the Nightingale of India?
5. a) Name the statue
   b) Name the freedom fighter you see in the picture
   c) Where is it located in India?
   d) State one contribution of this great man to our country.
   e) How tall is this statue?



VII) Mark the following:

1. On the political map of India,mark
   i. The state in which Statue of Unity is present.
   ii. The state where Lothal is located.
   iii. The state where Shri. C. Rajagopalachari held the Salt Satyagraha.
   iv. The state in which Cochin port is located.
2. On the river map of India, mark
   i. The river associated with Salt Satyagraha in Gujarat

VIII) Activity:

a. Make a collage of the important monuments/places of Gujarat

(Hints: Statue of Unity, Somnath Temple, Sabarmati Ashram, Lothal)

b. Try to find out about the excavations at Keezhadi, Tamil Nadu.

Give a presentation in the class on your learnings from it.

Animals – Our body 5

Expected Learning Outcomes

Students...

know the number of bones in the human body**,** the longest and smallest bone in human body, that joins facilitate movement.

know about muscles, tendons and ligaments**,** the parts that control reflex action**,** vertebrates, invertebrates, movable and immovable joints, neurons

know the meaning of orthopaedics, an orthopaedist, neurology and a neurologist

understand the role of skeletal system, **the importance of** skull, ribcage and vertebral column, **the functions of** the spinal cord, the human brain and its parts and the movable joints, **what** the term reflex action means

realise the need to wear a helmet while driving and riding on a two-wheeler

analyse the differences between sensory nerves, motor nerves and spinal nerves

appreciate the complexity of skeletal system

practise necessary exercises to keep the skeletal system healthy

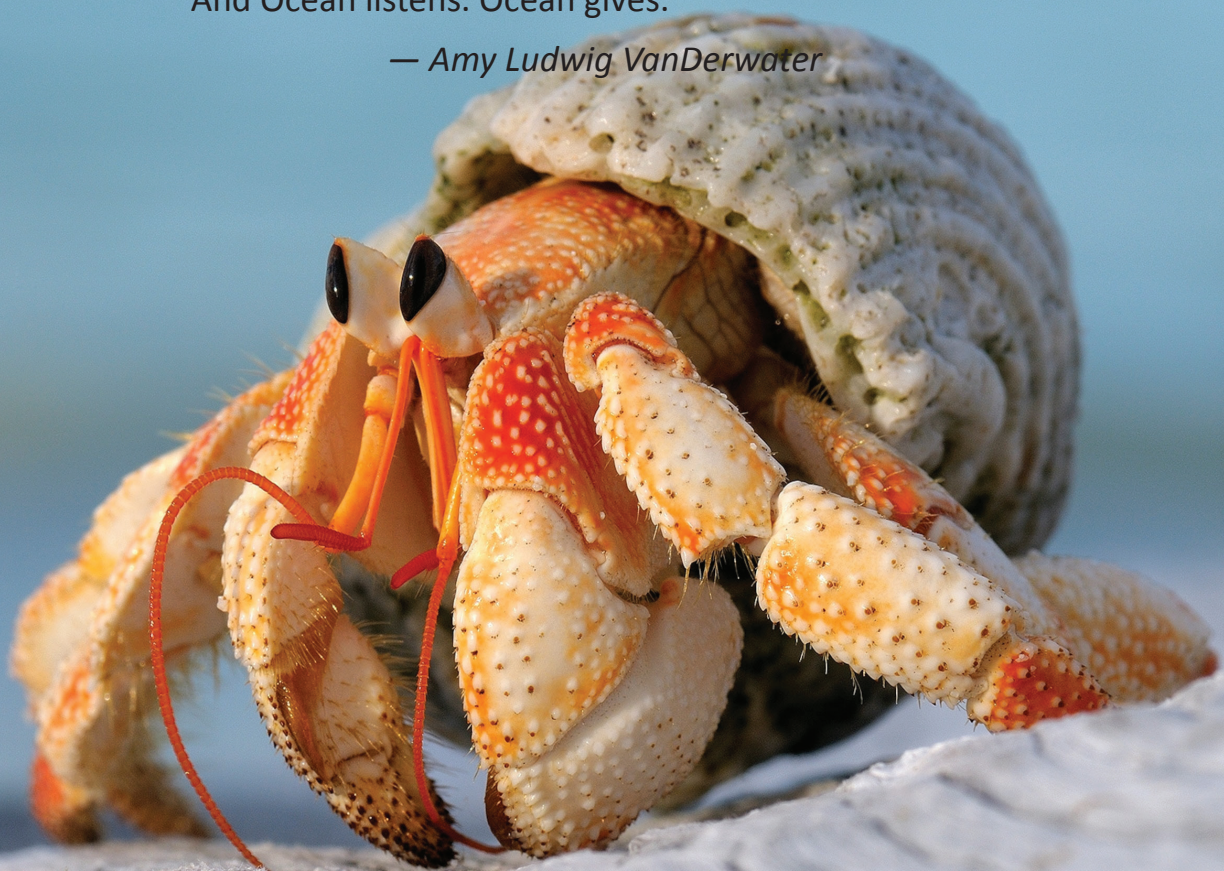
Setting the TONE

Have you heard of Hermit crabs? They usually tuck themselves into an abandoned shell as their soft body is exposed.

I am growing. I am feeling
I might need a bigger shell
For the one I am wearing now
Does not fit me very well.

I scurry-scuttle in the sea
Along this coral floor
Searching for a spacious place.
I peek in every door.
I'm picky as I pick my home.
A perfect spot to hide.
But don't think I am a hermit.
I just like to stay inside.
And you would too, if you were goo.
You'd know just how I feel.
Dinner out is dangerous—
I might become the meal.
Hermit crabs recycle shells.
That's how our bodies were designed.
Our bodies slide in spirals
That snails leave far behind.
Oh look! I think I see a big
And swirly shell where no one lives.
I tell the Ocean what I need.
And Ocean listens. Ocean gives.

— *Amy Ludwig VanDerwater*



Aakash, Chaitra and Aahna are siblings, who share their experiences every day during dinner time. Aakash animatedly shares the excitement that he experienced when he saw a skeleton of a dinosaur in the museum.

Aakash: Choto bon (younger sister in Bengali), last week we went on a trip to the museum. As we entered, there was a skeleton of a dinosaur at the entrance. I was so scared looking at it.

Skeleton of a dinosaur

But my teacher reassured my friends and me not to be scared. As we went on, we saw skeletons of more birds and animals. My teacher also said that some of them were already extinct.

Enrichment

A species is extinct when we do not see any more of its kind alive on Earth.

Aahna: Boro bhai (elder brother in Bengali), were you able to find out what animal it is by looking at the skeleton?

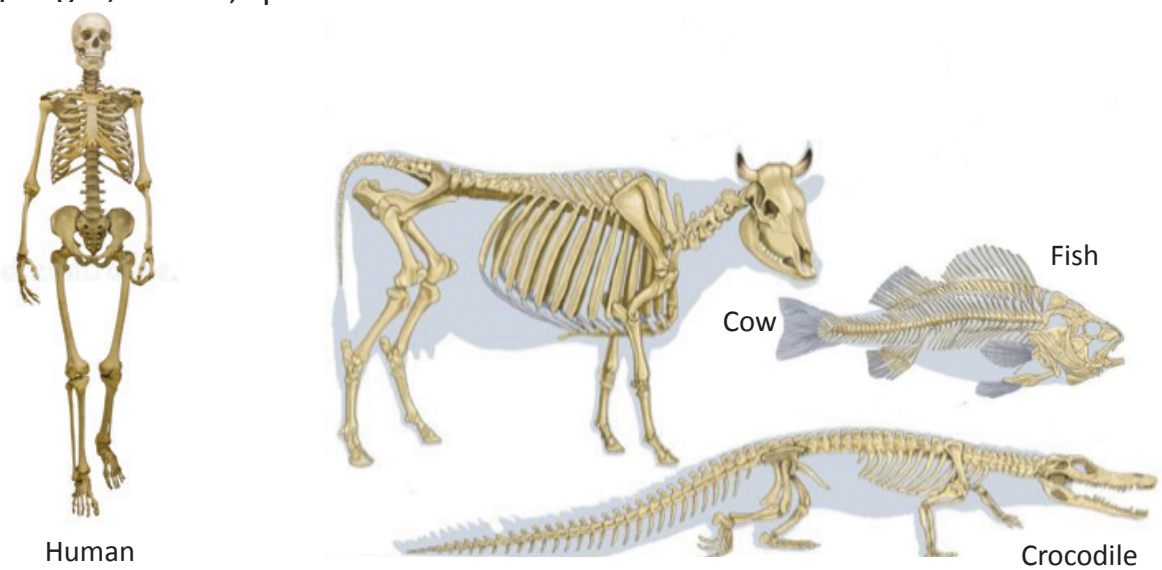
Aakash: Yes choto bon. My teacher told me that the skeletal system is a framework of bones. It is of a specific shape for each species. Since it gives shape to our body we can find out what animal or bird it is.

Chaitra: That is exciting. Tell me more about it.

Aakash: All **vertebrates** have a well-developed skeletal system.

Aahna: Wait...wait. So, are there animals without a skeletal system?

Aakash: Yes there are. They are called as **invertebrates**. Examples are sea stars, jelly fish, sponges, insects, spiders.



Human

Skeletal system of animals

Aahna: Oh! … You seem to know a lot. Tell me more boro bhai.

Aakash: Thank you! Some animals including human beings have a well developed

Jelly fish

Starfish

skeletal system. The framework of bones that makes the skeletal system gives form and shape to our body.

It helps us to move and protects the delicate internal organs of our body.

Chaitra: How does it help us move boro bhai?

Aakash: We have muscles attached to the bones. The bones and muscles together help us in movement.

Aahna: Which are the organs that are protected by the skeletal system?

Aakash: Look at the skull (points towards his head). The skull protects the brain. It is a hard bony case. It also protects our eyes, ears, nose and tongue.

Aahna: My teacher said that the brain is like the CPU of a computer. It co-ordinates all the activities of our body. So it is well protected.

Aakash: Do you know that our heart and lungs are protected by the rib cage?

Touch your back to feel your backbone. There are 33 small bones that are connected together to form the **vertebral column.**

The vertebral column protects the spinal cord.

Chaitra: What is a spinal cord?

Aakash: Spinal cord is a bunch of nerves passing through our vertebral column.

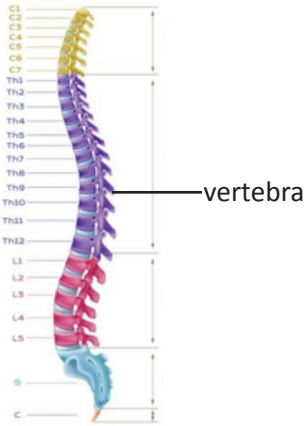
Aahna: That's a bit confusing. So, are spinal cord and vertebral column the same or different?

Aakash: Vertebral column or the back bone is a set of 33 bones, into which runs a bunch of nerves

Ponder

Why is it important to wear a helmet when we ride a two-wheeler?

extending from the brain. This bunch of nerves is called the spinal cord. It is these nerves that are responsible for reflex actions.



Human vertebral column

Imagine what would happen if we do not remove our hands immediately, when we touch a hot object?

Aahna: We would burn ourselves very badly. But what is reflex action?

Aakash: Before we go to reflex action let us see what action is. An action is a response to a stimulus. For example, you respond when I call you. The stimulus is hearing of your name and your turning towards me is the action or response to it.

Aahna: That's interesting. Can I say that a stimulus is a sensation to which we respond?

Aakash: Yes Aahna. Many of our responses are not quick, spontaneous. They are well thought out. But a reflex action is a spontaneous response to a stimulus. For example, what will you do if you step on a thorn?

Aahna: I will pull my leg away immediately.

Aakash: True. But would you think about what you need to do and then do it?

Aahna: Oh no! I would take away my leg immediately.

Aakash: Such actions, which happen spontaneously in response to a stimulus is called a **reflex action**. When you touch a hot object, you immediately take away your hand. In all these cases the actions are controlled by the spinal cord.

Enrichment

Our rib cage is made of 12 pairs of bones connected to the hard bone at the centre called the sternum.

Aahna: That's interesting. How does it happen?

Aakash: Messages are sent by the sensory nerves to the brain when there is a stimulus. The brain instructs the body to respond to the stimulus through the motor nerves.

In the case of reflex action, since the action has to be spontaneous, messages are received by the spinal cord and instructions are also given by the spinal cord to the muscles which result in quick action.

Chaitra: Our body seems to be very complex. You used a lot of new terms like sensory nerves, motor nerves, etc. Please tell me more about them.

Aakash: Sensory nerves are those that carry messages from different parts of the body to the brain. The motor nerves carry instructions from the brain to different parts of the body to act. We also have mixed nerves, which function as both sensory

and motor nerves.

Chaitra: You said that the brain controls the functions of our body. But, now you say that the spinal cord controls our reflex actions. It is a bit confusing.

Aakash: The brain controls all parts of our body. When I bring my hand close to your eyes what do you do?

Aahna: I will immediately close my eyes. Is this also reflex action?

Aakash: Yes it is. When a stimulus that may harm us is received by the sense organs on our face, the reflex action is controlled by the brain.

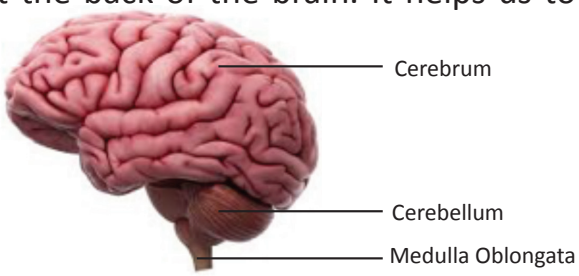
Aahna: How wonderful nature is in protecting us! You seem to be telling us more and more boro bhai.

Chaitra: That is quite interesting.

Aakash: Let us understand a little more about the brain.

The **cerebrum** is the largest part of our brain that helps us to think, speak, learn and remember. It is also known as the fore brain.

The **cerebellum** is the smallest part located at the back of the brain. It helps us to maintain balance when we stand, walk and also to judge the size of the objects that are at a distance.



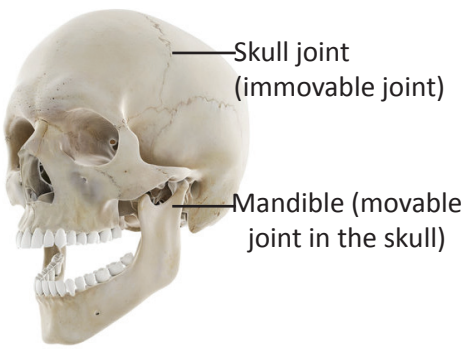
Medulla oblongata is the bottom most part of the brain that helps control heartbeat, breathing and blood pressure. It is also known as the brainstem. It plays an important role in connecting the brain with the spinal cord.

Chaitra: Amazing! You are going to be a doctor one day. What about the nerves, Aakash?

Aakash: Nerves are like cables that carry electrical impulses. They carry messages from the brain to the rest of the body and from the body to the brain.

Aahna: I want to become a doctor who treats the diseases of the nervous system. What are they known as?

Aakash: They are called **neurologists**.



Chaitra: Going back to what you said earlier, our vertebral column has 33 bones. What is the number of bones that we have altogether?

Aakash: An adult human has 206 bones. Infants

have about 270 bones.

Aahna: Do we move with the help of our bones?

Aakash: The parts where two or more bones meet are called **joints**. The joints that help in movement are called **movable joints**. The joints that cannot be moved are called **immovable joints**.

Chaitra: Immovable joints? Where are they present?

Aakash: Our skull is made of 22 bones. The joint in the lower jaw or the mandible is the only movable joint in the skull. Imagine what would have happened if that is also not movable.

Human ribcage

Aahna: We would not be able to eat or speak.

Chaitra: You told us that the skull protects the brain, eyes, ears, nose and tongue.

Aahna: You also said that the rib cage protects the heart and the lungs. How many bones are there in our rib cage?

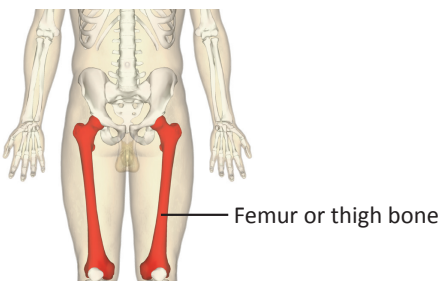
Aakash: The rib cage is made of 12 pairs of bones attached to a flat bone at the centre of the chest called the **sternum**, in the front and to the vertebrae at the back.

Chaitra: What are vertebrae?

Aakash: Vertebrae are the bones that make the vertebral column. The singular of vertebrae is **vertebra**.

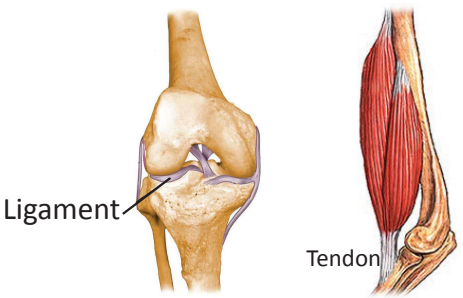
Aahna: Which is the longest bone in our body?

Aakash: The **femur** or the **thigh bone** is the longest bone in our body. It is also a very strong bone**.** The smallest bone in our body is located in our inner ear. It is small but helps in the transmission of sound.



Aahna: That is an exciting piece of information boro bhai. How do our joints help in movement?

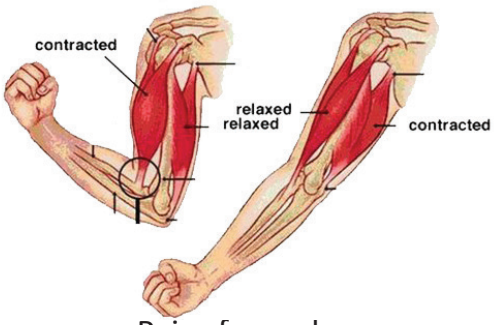
Aakash: The bones at the joints are connected to each other by strong fibres called **ligaments.** They hold the bones together at the joints and keeps them stable.



Chaitra: But what makes us move?

Aakash: **Tendons** connect the muscles to the bones. Bones, tendons, ligaments and muscles together help us move. Generally, a pair of muscles help us move.

When one muscle contracts, the other relaxes and thus helps us to move.



Pair of muscles – one contracts and the other relaxes

Chaitra: So we have tendons, ligaments, muscles and joints that help us to move.

Aakash: Yes. Have you observed Chaitra, that we cannot move all the joints the way we want to?

Enrichment

The stapes located in the ear is the smallest bone in our body.

For example, try moving your knee. You can fold your knee in one direction only. Such joints are called **hinge joints.**

Aahna: (moving her shoulder joint) Boro bhai, I am able to rotate my shoulder. Is shoulder a joint? What joint is it?

Aakash: It is called the **ball and socket** joint. You can rotate such joints.


Human knee joint (hinge joint)


Human shoulder joint (ball and socket joint)

Aahna: It's very interesting. One of my friends met with an accident once and he said that he suffered a fracture. He went to a specialist who treats diseases of the bone. I don't remember the name of the speciality.

Aakash: It's orthopaedics. An **orthopaedist** treats diseases of bones and also fractures caused due to accidents.

Enrichment

When a bone cracks or breaks, it is called a fracture.

Aahna: I am going to become an orthopaedist when I grow up.

Aahna's mother calls out for the children.

Ma (mother in Bengali): Children, let's all retire to bed. We have a long day tomorrow.

SUMMARY

- The skeletal system is a framework of bones.
- Vertebrates have a well-developed skeletal system while invertebrates do not.
- Functions of skeletal system
  - gives form and shape to the body
  - protects internal organs
  - helps us to move
- Actions which happen spontaneously in response to stimulus are called reflex actions.
- Spinal cord is a bunch of nerves passing through our vertebral column and is responsible for reflex action.
- Nerves are of three types - sensory nerves, motor nerves, mixed nerves
- Major parts of the brain are cerebrum, cerebellum, medulla oblongata
- Human skeletal system consists of 206 bones.
- One of the functions of the skeletal system is to protect delicate internal organs. The skull protects our brain, spinal cord is protected by the vertebral column and ribcage protects the heart and lungs.
- The place where two bones meet is called a joint.
- There are different types of joints based on the type of movement they facilitate.

Let's do

I Choose the correct answer:

1. Which is the longest bone in the human body?

a) Stapes b) Femur

c) Vertebrae d) Mandible

2. Messages from brain are carried by _____ to different parts of the body.

a) Motor Nerves b) Medulla oblongata

c) Sensory Nerves d) Sternum

3. An adult human body has

a) 302 Bones b) 206 Bones

c) 365 Bones d) 270 Bones

4. The part of the brain which helps to maintain balance in the body is

a) Medulla oblongata b) Spinal cord

c) Cerebrum d) Cerebellum

5. The only movable joint in our skull is

a) Hinge joint b) Mandible

c) Hip joint d) femur

II Name the following:

1. Actions which happen spontaneously in response to stimulus.
2. An example of an invertebrate.
3. Part of the brain which controls heartbeat.
4. The type of joint located in the shoulder.

III Get me right?

1. I protect the brain.
2. I protect the heart and lungs
3. I am your CPU
4. I am the flat bone at the centre of the chest

VI Answer the following:

1. What is the function of the spinal cord?
2. What are joints? Mention the types of joints and give an example for each.
3. Differentiate between sensory and motor nerves.
4. Brain is one of the most important parts of our body. How is it protected?
5. Explain how the movements are brought about in the parts of our body?
6. What is reflex action? Explain with two examples.
7. List the functions of our skeletal system.
8. Differentiate between hinge joint and ball and socket joint.

VII . Art Integrated Activity:

Draw the following:

a. Star fish

b. Human brain (Label the parts)

Water

Part-I

6

Expected Learning Outcomes

Students...

recollect the concept of RWH and the civilisations that flourished on river banks

know that RWH was practised in ancient India, the unit of measurement of rain in the Mauryan period, the primary and secondary fresh water sources

know about Cheruvu,kere and eri, water table and rural and urban harvesting of water,the book that talks about governance and water management in ancient India, the evidences of irrigation in ancient civilisations e.g., Dholavira, Lothal and Imangoan

understand the need for better water storage with a growth in population, the system of RWH in ancient India using the primary and secondary fresh water sources, the need to reconstruct traditional water systems, the reason for scarcity of water in modern India, the need for water storage system in Kashmir region, the process of RWH in Sringaverapura, **how** surplus water storage in dams was done during the ancient and medieval periods of India **why** keres and eris are interconnected, **how** Bhopal got its name, **the importance of** groundwater recharging in coastal areas.

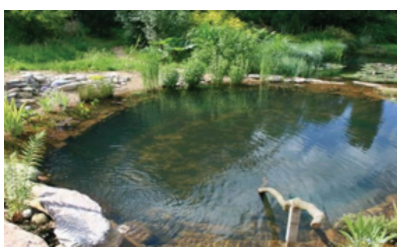
learn the various methods adopted to recharge ground water

appreciate the need to interlink rivers to manage water resources efficiently

Setting the TONE

Nature's bounty





If not conserved...


Reena comes back from school on a Saturday afternoon and finds her uncle and brother Vikram at home.

Reena: Mama (mother's elder brother in Odiya), Saturday activities are getting more and more interesting. How I wish that everyday was a Saturday!

Vikram: What was so exciting about today's activity, bahin (younger sister in Odiya)?

Reena: We had a session on water conservation. The person who was invited to speak was very knowledgeable dada (elder brother in Odiya). He spoke at length on Rain Water Harvesting (RWH). I thought that I have learnt a lot about it in III and IV standards. But when I listened to him I understood that there is a lot more to know.

Mama: That is why we say "Vidya dhathathi vinayam". The more you learn, the more you know what you don't know. Now tell me all about your excitement. What did you learn today?

Enrichment

Rain water harvesting (RWH) is the collection and storage of rain water that runs off from roof tops, parks, roads, open grounds, etc. This run off water can be either stored as surface water or can be used to recharge ground water.

Reena: He spoke on the importance of rain water harvesting (RWH). He told us that ancient India, had good RWH systems and each individual was responsible for harvesting rain water, its storage and judicious use of the resource. The citizens were responsible for the maintenance of all water bodies.

Dada: I have also learnt in my social science class that India had various methods of rain water harvesting right from a very early period.

Mama: Till about 3000 BC, the human population should have been very less. That was probably the beginning of gaining knowledge. Rain water harvesting happened without any human interventions. Water collected in the crevices and depressions on the Earth naturally and percolated into the soil as underground water.

Rain is always the primary source of fresh water. The secondary sources of fresh water are the rivers. World over civilisations flourished on the river banks, for eg. the Egyptian civilisation on the banks of Nile, the Mesopotamian civilisation on the banks of Euphrates and Tigris and the Indus Valley civilisation on the banks of River Indus, because of the availability of fresh water.

TASK

Has RWH been done near your place? Find out and discuss.

As the population grew, our need for water and food also grew. Agriculture, the occupation that feeds people needs a lot of water. Observing nature, man started making

depressions and storages to harvest water and started moving inlands away from the rivers. When this happened the need for better storage facilities for rain water started increasing.

Reena: That is very interesting, mama. You mean to say that we followed rain water harvesting much earlier? Did we have so much of knowledge and skill?

Mama: Archaeological evidence of irrigation and water systems are found in Dholavira, an important site of Indus Valley. Small bunds built during that period are also seen at Lothal in Gujarat and Inamgaon in Maharashtra.

Dholavira

Lothal

Kautilya's Arthashastra talks in detail about tanks and bunds built during the period of the Mauryan Empire. He also mentions about the system of measuring rainfall like how we do now. The measure used to assess rainfall was 'drona'.

Inamgaon

Reena: That is very interesting, mama, what more does he talk about in his book.

Mama: Kautilya's book on governance of the state, talks in detail about agriculture, irrigation, taxation for agricultural produce and use of state's resources for irrigation. Thus, we get an insight into the kind of life people led during those days and how resources including land and water were managed.

In the first century BCE, Sringaverapura near Prayagraj had a sophisticated rain water harvesting system with three chambers. In the first chamber the water was allowed to stand so that the suspended impurities settled at the bottom. It was then passed through a brick-lined tank and then to a stepped inlet. The inlet led to another tank, which had channels for excess water to flow out, to ensure it reached the River Ganga.

Enrichment

- Irrigation is the supply of water to crops to help their growth, typically by means of channels.

I am sure you know about the Grand Anicut that was built by Karikala Chola across River Cauvery. It was mainly built to divert the excess water in Cauvery during the seasonal rains, so that it could be used for irrigation later.

Sringaverapura

Reena: Mama, my teacher told us about a lake in Bhopal. Please tell me more on it.

Mama: Do you know that Bhopal is the capital of…

Reena: Madhya Pradesh.

Mama: That's correct. Bhopal got its name from Bhojtal. The lake was built by King Bhoja. It was one of the largest lakes in India. But now the lake has shrunk in size. Though it has shrunk in size, it is the source of drinking water even today for Bhopal.

Reena: What about the Himalayan region mama? Regions like Kashmir should have an abundance of water.

Bhojtal

Mama: A good thought Reena. In such regions, there was the problem of floods. Remember, the rivers there are snowfed. So, the rivers go in spate in summer. The fields get flooded in summer and the peasants lose their harvest.

To avoid this and to conserve water, King Suvarna, built a canal called Suvarnamanikulya. His successor, King Damodar II, constructed a dam called Guddasetu for bringing water into the town, on a barren land. King Lalitaditya is remembered for building a number of canals to provide relief from recurring floods and to conserve water.

Dada: I have also read about the step wells in Rajasthan, Gujarat and Delhi.

Enrichment

List of important dams in India

Rivers	Dams	States
Bhavani	Bhavani Sagar dam	Tamil Nadu
Narmada	Indira Sagar Dam	Madhya Pradesh
Narmada	Sardar Sarovar Dam	Gujarat

Mama: Yes, even today we have them in the places that you mentioned. The Rani ki Vav and Chand Baori are examples of such step wells. But today they are places of interests for tourists and not for water storage.

Rani ki Vav

Chand Baori

Dada: We were knowledgeable and were conserving water. But, why do we face a shortage of water now? Why do we have to borrow technology from others?

Mama: Traditional rain water harvesting systems were decentralized, i.e. they were maintained by the citizens themselves. It was called "Kudimaramathu" in Tamil. The public maintained the system well and were responsible for its upkeep.

When the British took control of India, they did not understand these traditional systems. The Government took over the role of the provider of water. Earlier the people were dependent on these systems, not only for agriculture, but also for drinking water. When the government took over that too, traditional sources of fresh water were neglected. We were made to believe that it is unhygienic to consume water from these places. Slowly, the water turned unfit for drinking because we did not upkeep the places.

This marked the end of a tradition and the entire system has to be rebuilt now.

With the industries booming, the effluents let out by factories also polluted the available sources of surface water. This led to severe water scarcity.

Enrichment

Effluent is the waste that are let out by industries into the water bodies.

To overcome the scarcity, we started exploring and then exploiting the available ground water for drinking, irrigation and also industries. We now draw more and more water from the ground, without thinking about how it could be recharged. It is like trying to draw money from a bank, without depositing any in it.

Reena: You mean to say that the Earth would one day not have water to give us if we do not recharge.

Mama: You got it right my dear. Capetown in South Africa became ground water zero in 2018. It is definitely a very scary situation. We have to keep recharging the

groundwater if we have to continue to use it. Plants need the water underground to grow.

Reena: So, what is the solution?

Mama: Rain water harvesting and judicious use of water seems to be the way out of it.

When we talk about rain water harvesting, we always think of harvesting rainwater from the roof tops, as you have learnt already. The water that flows on the surface around our houses and on roads during rains can also be harvested.

Reena: If we can do that we can avoid floods also.

Dada: Yes Reena. We need not wade through water to reach our school. We will not have water logged compounds.

Reena: We need not wait for water tankers during summer.

Mama: The surface water can be collected using suitable conduits, in filtration tanks for removal of suspended impurities. This can be used for purposes other than drinking.

However, it can be taken via conduits to wells, so that they can recharge the wells. In such cases the soil acts as a natural filter.

FACT FILE

The insoluble impurities that remain in water are called suspended impurities.

Temple tank

The temple tanks were also good rain water harvesting systems. Water flowing in the surrounding areas collected in the temple tanks by gravity. The tanks, were a source of water and also helped in maintaining the water table in surrounding areas.

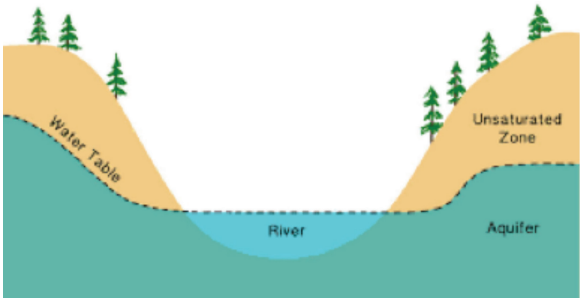
Reena: What is a water table mama?

Mama: It is the depth at which we can reach the underground water from the soil. Do you remember reading the newspapers that the level of underground water in Chennai city had risen after a bountiful monsoon?

Till about few years ago even in cities we had wells in almost all of the houses. The wells were dug upto a depth of about say 25 to 30 feet. These were known as **shallow wells**.

But, when water was not found at that depth, we did not understand that we needed to recharge our lakes and ponds to get sufficient water. We went deeper into the earth via bore wells to get water from greater depths. But, we have also been disappointed, as we would not be able to find water at that depth too. The best way to overcome this problem is to harvest every drop of rainwater so that it recharges the shallow

wells and the surface water sources like the lakes and ponds, so that water percolates to the underground storage.



Water table

Reena: Is rain water harvesting required only for cities?

Mama: Rain water harvesting becomes more important for cities because the roads and other areas are paved and does not allow rainwater to percolate naturally. In villages, we still have some unpaved places where water can percolate and maintain the water table.

Rural harvesting is mostly surface storage like building conduits to rivers, lakes, ponds, etc. so that they can recharge the shallow storage around the area and provide water for drinking and agriculture. Urban harvesting on the other hand is done for collecting the run off water as ground water due to lack of open space.

Do you know that coastal areas need to harvest rain water to tackle another problem too?

Dada: What is the problem mama? I thought we had a huge water body, the Bay of Bengal in the east and the Arabian sea on the west.

Mama: That is the reason those areas need to be looked at immediately for replenishment of ground water. Have you heard that water finds its own level and flows to fill in any space that it can flow through?

Dada: Yes, I have. I know that water flows, hence it is a fluid.

Mama: Imagine what would happen if the underground water depletes and you do not replenish it.

Dada: Will sea water fill in that space?

Mama: You are right. When the salt water from the sea inundates these aquifers, they are damaged irreversibly as sea water is salty and not potable. So in the coastal cities and towns it is mainly to recharge the aquifers for future safety and usage rather than for immediate use.

Enrichment

An aquifer is a body of rock and/or sediment that holds groundwater.

Reena: That was a good learning. Please tell me if I am right. To make sure that we get enough water to survive, we need to harvest every drop of rain that we get. We also need to reduce pollution of water bodies to the extent possible.

Dada: In the last year's annual day, there was a programme on interlinking of rivers.

I thought that was the way to solve the water crisis.

Think about...

What is the first river interlinking project in India? Discuss.

Mama: Interlinking of perennial rivers of the north with the rain fed rivers of the south has been the dream of many for a long time. As Mahakavi Bharatiyar long time back said "Vangathil odi varum neerin migaiyal maiyathu naddugalil payir seiguvom".

Reena: You seem to be well versed in Tamil, though our mother tongue is Odiya. What does the line that you quoted now means?

Mama: It means that from the excess water that flows in the perennial rivers, we can get a bountiful harvest in the Deccan plateau. Mahakavi Bharathiyar was a visionary who had thought of interlinking rivers, even when water was not a scarce resource.

Reena: Thank you, mama. It was indeed an excellent learning. I am sure when I grow up, I will do something to make our country good at water management. Thank you.

Enrichment

Water that is fit for drinking is called potable water.

- Rainwater harvesting (RWH) is the collection and storage of rain water that runs off from rooftops. This can be either stored as surface water or can be used to recharge ground water.
- Many civilizations flourished on the river banks because of the availability of fresh water for consumption and irrigation.
- Archaeological evidences on irrigation, agriculture, taxation for agricultural produce and governance are found in various parts of India.
- Details of tanks and bunds are mentioned in Kautilya's Arthashastra along with that of the system of measuring rainfall.
- The Grand Anicut was built by Karikala chola to divert the excess water in Cauvery during the seasonal rains so that it could be used for irrigation.
- To conserve water King Suvarna had built a canal called Suvarnamanikualya and his successor King Damodar II had constructed a dam called Guddasetu for bringing water into the town.
- Kudimaramathu – The rainwater harvesting system was well maintained by the people of of ancient Tamilnadu
- The temple tanks act as good rainwater harvesting system as the water flows from the surrounding areas into the temple tanks due to gravity.
- The depth at which we can reach the underground water from the soil is referred to as water table.

- Interlinking of perennial rivers can limit the wastage of water while enriching the rain fed rivers of other regions
- Mahakavi Bharathiyar was a visionary who advocated the interlinking rivers even at a time when water was not a scarce resource.

Let's do

I Name the following:

1. The method of collecting and storing rainwater.
2. The civilization that flourished on the banks of the river Euphrates and Tigris.
3. The primary source of fresh water.
4. A book written by Kautilya.
5. The measure used to assess rainfall in ancient times.
6. The place in South Africa which recorded zero groundwater in 2018.

II Fill in the blanks:

1. The secondary sources of fresh water are the _____.
2. The supply of water to crops through channels is known as _____.
3. Wells that were dug up to a level of 25-30 feet are called as _____.
4. The depth at which we can reach the underground water from the soil is _____.
5. Water that is fit for drinking is called _____.
6. To conserve water, King Suvarna built a canal called _____.
7. The natural filter for rain water is _____.
8. Grand Anicut was built across the river _____.

III Match the following:

Sophisticated rainwater harvesting system	Rani ki Vav
River Nile	Prayagraj
Bunds	Egyptian civilization
Step well	Inamgaon

IV Correct the underlined words and rewrite the entire sentence:

1. Indus valley civilization flourished along the banks of river Indus because of the availability of **salt water**.
2. **Suvarnamanikulya** is a rain water harvesting system with three chambers.
3. Indira Sagar dam was built across the river **Cauvery**.
4. Potable water is **unfit** for drinking.

V Answer the following:

1. What does rain water harvesting mean?
2. How did rainwater harvesting happen in ancient India even without any human intervention?
3. Why did Karikala chola build the Grand Anicut?
4. How does rainwater harvesting system work?
5. What is meant by water table?

VI Answer in detail:

1. What do we know about water storage system from Kautilya's Arthashastra?
2. Write a short note on Sringaverapura
3. How did kudimaramathu work?
4. What is river interlinking project? How is it beneficial to our country?
5. a) Identify the rainwater harvesting system near Prayagraj

   b) When was it constructed?

   c) How many chambers are found in the system?

   d) To which river did the excess water flow into?

   e) State any one features of the system.

VII i) On the political map of India, mark the following:

1. State in which Inamgaon is located
2. State in which Grand Anicut dam is located
3. State in which Rani ki Vav is located
4. State in which Chand Baori is located
5. State in which Bhojtal is located

ii) On the river map of India, mark

1. River Cauvery
2. River Narmada

VIII ACTIVITY:

1. Assess the quantity of water you use everyday
    a. to have bath
    b. to wash clothes
    c. for cleaning vessels
    d. for gardening
    e. for mopping the house
2. Identify ways to reduce the quantity of water used for these activities.

Materials Around Us 7

Expected Learning Outcomes

Students...

know a few states where some metallic ores are found.

know what materials, minerals, ores, metals, non-metals, alloys, opaque, transparent and translucent objects, biodegradable, non-bio degradable substances are.

understand the difference between natural and man-made materials, metals, non-metals and alloys, conductors and insulators, opaque, transparent and translucent objects

understand the treatment of dry and wet waste, the reason for using copper in electrical wires, storing water in copper vessels, using PVC and plastic as insulators, **how** non-metals and alloys are useful in daily life

learn how to group materials as natural and synthetic, identify metals, classify objects as transparent, translucent and opaque

Setting the TONE

Make a list of things that you observe/use in schools, at homes, on the playground. Try to find out the materials that each one is made of.

Window

Cupboard

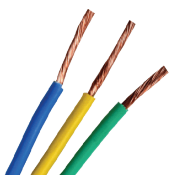
Slippers

Erasers

Winter clothes

Tyres

Vessels



Wires

Mugs

Vijay is going around the house with his notebook and pencil in hand, trying to figure out something in the house.

His dada (grandfather in Punjabi) is intrigued by his behaviour and intervenes.

Dada: Vijay, are you searching for anything in particular? Do you think I can help you?

Vijay: Dada, my EVS teacher asked me to make a list of natural and man-made materials in the house. But everything that I see around like the vessels in the kitchen, the sofa, the mattresses, the books and what not seem man-made to me. So, I am very confused.

Dadi (grandmother in Punjabi): Don't worry Vijay. Such confusions arise when we learn something new. Let us sit down and discuss as to how to go about it.

Vijay: Thank you dadi.

Dadi: First, let us understand what a 'material' is. A **material** is a substance that can be used for making something. For example, the shirt that you are wearing is made of cotton, the utensils are made of either aluminium, stainless steel, porcelain, glass or wood.

Think about...

1. Have you felt confused when you learnt something for the first time?
2. How did you resolve it?

Dada: Look at the PVC pipes that are used in plumbing. Polyvinyl chloride (PVC) is a synthetic material.

Vijay: Synthetic? What does it mean?

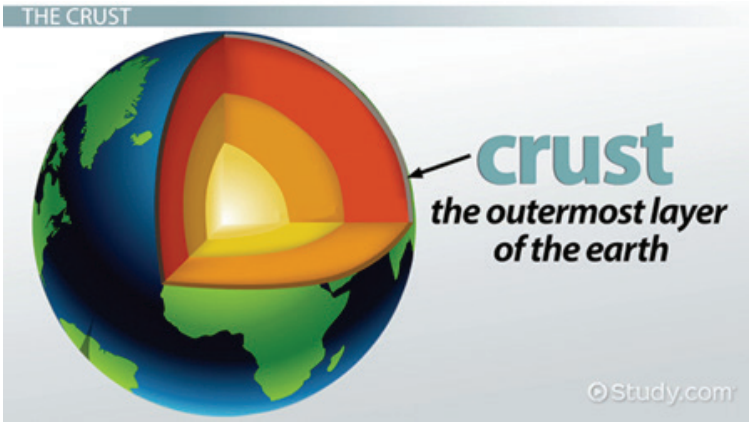
Dada: Materials can be either natural or synthetic. Man-made materials are called synthetic materials. Example: plastics, rayon, nylon. Examples of natural materials are cotton, jute and metals.

Vijay: Oh! How happy I am after I have understood this. Now let me make a list of natural and synthetic materials at home.

Help Vijay complete the table:

Natural Materials	Synthetic Materials

As he continues with his work a doubt arises in his mind and he approaches his dada again.



Vijay: Dada, I have another doubt. I was trying to make out what the cooking utensils are made of and I asked my mother. She says that they are made of metals. But my teacher told me that they are made of metals or alloys. I am confused now. Are they made of metals or alloys? Are metals and alloys natural or synthetic?

Dada: I appreciate your systematic thinking to seek solutions. Let us try to understand this further. Do you know where we get metals from?

Vijay: They are got from the Earth's crust dada.

Dadi: Yes, metals occur in the Earth's crust in the form of minerals. **Minerals** contain a mixture of many metals. But some minerals have a large quantity of a particular metal. Such a mineral from which a metal can be profitably extracted is called its **ore**.

Metal	Common ore
Aluminium	Bauxite

Enrichment

The process by which a metal is obtained from its ore is called extraction.

Vijay: Since they are obtained from the Earth's crust metals are natural substances.

Dada: Now give me a list of metals that you see in the house.

Vijay: Iron, copper, stainless steel, bronze, brass…

Dada: Amongst the substances that you listed, stainless steel, bronze and brass are alloys. They are not metals.

Vijay: That's interesting dada. What are alloys?

Dada: **Alloys** are a mixture of either two or more metals or a metal and a non-metal.

Vijay: That makes it more interesting. What are non-metals? How do we mix two metals?

Dadi : The required metals are molten. The molten metals are then mixed to get the alloy. For example, iron rusts easily, but when we mix it with chromium, nickel, it does

not rust that quickly. Copper reacts with sour food substances easily. However, when it is alloyed with tin, it does not react that easily. Thus, we make an alloy to get a material with desired properties.

Iron is also made into an alloy with carbon and is called carbon steel. Carbon steel is of great use in buildings, bridges, cars, washing machines, etc.

Alloy	Constituent metal	Uses
Stainless steel	Iron, chromium, nickel	Utensils, stair case railing
Brass	Copper, zinc	Door knobs, decorative items
Bronze	Copper, tin	Utensils, decorative items, medals
Duralumin	Aluminium, magnesium	Air craft frames

Vijay: Metals seem to be very fascinating. Please tell me more about them.

Dada: I am happy that you are interested in learning more. Let me check if we have any electrical wire that I can show you.

Here I found one. Let me find something sharp to cut it open and look at what is inside.

After cutting open the wire...

Vijay: Dada, there is a thin metal inside. It looks like copper.

Dadi: How do you know it is copper Vijay?

Vijay: Its colour and lustre are similar to the vessel you use to store water dadi. You told me it is copper.

Dadi: Good observation. Yes, it is copper. By the way all metals have a metallic lustre. Why do we use copper to make electrical wires?

Vijay: Please tell me. I don't know.

Dadi: Copper allows electricity to pass through, (i.e.) it is a good conductor of electricity. So, copper is used for making electrical wires.

Vijay: Are all metals good conductors of electricity?

Dadi: Most metals are good conductors. Silver is the best conductor of electricity.

Vijay: Then why don't we use silver to make electric wires?

Dada: Silver is extremely costly. It is not available in abundance like copper.

Vijay: But why do you prefer water stored in copper containers?

Dada: Copper is believed to destroy microorganisms that may cause diseases.

Enrichment

Micro-organisms are those that cannot be seen with our naked eyes. Anti-microbial agent is one that can kill the microbes.

Vijay: Thank you dada. You were also talking about something else, I forget its name!

Dadi: The non-metals dear?

Vijay: Yes dadi, what are non-metals? Are they the opposite of metals?

Dadi (chuckles): To a large extent, yes. **Non-metals** are also natural substances that occur in the Earth's crust, they are present in the atmosphere as gases too.

Vijay: That's interesting! Please tell me more!

Dadi: You have learnt about the three states of matter solid, liquid and gas. Haven't you?

Vijay: Yes dadi. I remember.

Dadi: That's great. Now list a few metals.

Vijay: Aluminium, copper, iron, tin, gold…

Dadi: In what state are they?

Vijay: They are solids.

Dadi: All metals occur in the solid state except mercury, which is in the liquid state.

Vijay: Wow! In what state do non-metals occur?

Dadi: Non-metals occur as solids, liquids or gases. Bromine is the only liquid non-metal. Hydrogen and oxygen are examples of gaseous non-metals. Carbon and sulphur are examples of non-metals that occur in the solid state.

Enrichment

An atmosphere is a mixture of gases that envelop the planet.

LIQUID	
Non-metal	**Metal**
Bromine	**Mercury**
	

Vijay: If metals are good conductors of heat and electricity. Non-metals are…?

Dada: Good learning Vijay. Non-metals are poor conductors of electricity. We use metals to make utensils, while we do not use non-metals. Can you guess the reason?

Vijay: We cannot beat them into different shapes like metals.

Dada: That's a great way to look at it. Metals can be beaten into sheets, drawn into wires and made into any shape. Non metals cannot be done so. Most metals are good conductors of heat, but non-metals are not. Hence, Non metals cannot be used to make utensils.

Vijay: When I started the discussion, I thought I knew all about materials. But, now I understand that there is a lot more to learn.

Dadi: That's true.

(विधया ददाथि विनयम – Vidhya Dadathi Vinayam) Knowledge gives humility

Vijay: Have I seen non-metals dadi?

Dadi: Yes Vijay. Have you seen the iron man at the end of our road burn coal?

Iron box with burning coal

Vijay: Yes, I have!

Dadi: Coal is a non-metal. It is nothing but carbon. Some constituents of air like hydrogen, nitrogen and oxygen are also non-metals.

Vijay: That's fascinating!

Dada: Did you note down the points for your project Vijay? Now it is time to put everything together and submit it on time for assessment.

Vijay: Yes dada. I am searching for my pencil box and I am not able to locate it.

Dada: Check whether it has fallen behind your books. You would not be able to see it from this side.

Vijay moves his books to check whether his pencil box was behind them.

Vijay: Dada, it is here. But again I have a doubt. I am able to see through some objects while I am unable to with others, for instance, I can see what is in the pencil box without opening it, but why did I have to move the books to see what was behind them.

Dada: This pencil box, is **transparent**, (i.e.) it allows light to pass through it fully. But your book is opaque. It does not allow light to pass through at all.

Vijay: What about my plastic scale dada? I can see through it but not as clearly as my other scale.

Dada: Such objects that allow some light to pass through them are called **translucent.**

Transparent Object

Translucent Object

Opaque Object

You can see through them, but not as clearly as through transparent objects. For example, some kinds of glasses, plastic, butter paper.

Vijay: So, materials can be grouped as transparent, translucent or opaque depending on the amount of light that passes through them.

Dadi: You are exactly on dot Vijay. Any more doubts, before you begin writing?

Vijay: I think I have a lot more, but one last for clarification.

Dada, you opened something like a plastic to show me the copper wire inside. What was it dada?

Dada: That is a cover of insulation.

Vijay: Insulation? We did not discuss this at all.

Dada: You know that copper is a good…

Vijay: Conductor (smiles).

Dada: Good. Suppose we accidentally touch the wire.

Vijay: Oh! We would get a shock.

Dada: Very true. To avoid an electric shock, wires are covered using insulating material like PVC (poly vinyl chloride). Insulators do not allow current to flow through them.

Vijay: Do such materials not conduct heat too?

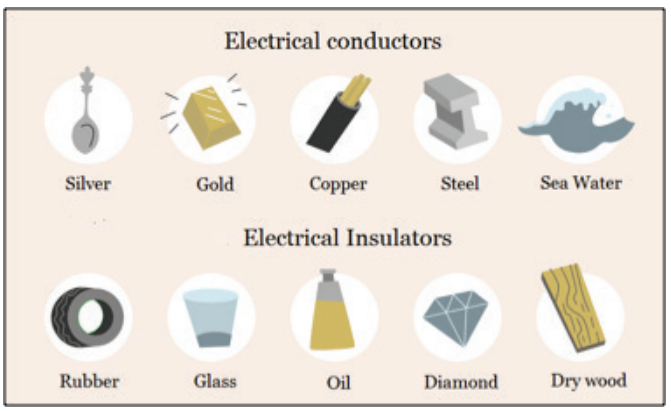
Dada: Yes. Materials like PVC are insulators. They melt easily when heated.

Dadi: You would have seen that the ladles that we use in the kitchen for stirring while cooking have a wooden handle.

Vijay: Yes. I have seen. Now, I am able to connect. The wooden portion does not get heated up whereas the stainless steel part is hot. So, wood is a poor conductor of heat. Am I correct?

Dada: Very correct. We use a wooden scale to switch on or off the electric switch, if we think that there might be an electric shock, because wood is a poor conductor of electricity.

Dadi: Vijay, I think you have understood a lot about the materials around you. It's high time you put them down in writing for your project.



Vijay: Dadi, I need to throw away my fruit peels before I begin my work. In fact, I also need to learn about waste disposal. My teacher told me that there are different coloured bins for different

kinds of wastes. Please help me recollect it like how you helped me with the rest.

Dadi: I appreciate your teachers for making you children relate what needs to be done in real life with learning in school.

We shall try to understand the nature of the waste that we have generated.

What would happen if you leave the peels in the garden for a day or two?

Vijay: They would wilt and after a few days I cannot see them at all. They would have mixed with the soil.

Dada: Good Vijay. Substances like these which decay when left in nature, add to the fertility of the soil and does not harm the environment are called **bio-degradable** substances.

Vijay: So, all vegetable, fruit and flower wastes are bio-degradable. I also understand that plant and animal products are bio-degradable. To connect with what I have learnt, all natural substances are bio-degradable.

Dadi: That is a good way to learn. But let us analyse a little more before we conclude. Amongst natural substances we also looked at metals and...

Vijay: Non-metals. I remember. Metals are hard, non-metals are soft, metals are sonorous (they make a sound when we strike them); non-metals are not, etc.

Dadi: Good Vijay, are they bio-degradable?

Vijay: They should be as they are also natural substances.

Dadi: Metals and non-metals are non-biodegradable though they are natural substances. They are not broken down into simpler substances by nature for an extremely long period of time. So, they are non-biodegradable.

Vijay: Dadi, so there are some natural substances that are non-biodegradable. What in nature breaks down or decomposes some substances?

Dadi: There are several micro-organisms in the soil that break bio-degradable substances into simpler substances that can make the soil fertile.

Vijay: Dadi, I have not disposed my fruit peels yet, what do I do?

Dadi: Let us think through a little more.

Vijay: Dadi, you make things so very logical.

Dadi: If you understand the reason and logic behind practices, it would help you follow them more diligently. Now tell me the colour that comes to your mind, when we talk about soil fertility, making the soil better, etc.

Vijay: Green

Dadi: So, in which colour bin should you dispose your bio-degradable wastes?

Vijay: So easy dadi, of course in green bins.

Dadi: The wet waste that can be composted would go into the green bin.

Wet waste

Dry waste

e-waste

Enrichment

e-waste or electronic waste refers to discarded electronic devices and equipments such as computers, cell phones, TVs, and other electronic appliances.

Vijay: Is there anything called dry waste?

Dadi: Paper, card board, plastics that are dry and can be recycled will go into the blue bin. The rest of the waste like the e-wastes would go into the black bin.

Dada: Remember the wet wastes are re-used, the dry wastes are recycled and we need to reduce the wastes that go into the black bin.

Now dispose the peels, pick up your assignment sheets and start working.

The assignment for life is to follow what you learn in your classes.

SUMMARY

- Materials can be natural or synthetic.
- Materials can be classified as metallic or non-metallic.
- Alloys are the mixture of two or more metals or a metal and a non-metal, in fixed proportions.
- Metals have various uses based on their properties.
- Materials which allow light to pass through them fully are transparent and those which do not allow light to pass through at all are opaque.
- Objects that allow some amount of light to pass through them are translucent.
- Electrical conductors allow electricity to pass through them while insulators are materials which do not allow electricity to pass through.
- Materials which allow heat to pass through them are called good conductors of heat and those which do not allow heat to pass through easily are called poor conductors or insulators of heat.
- Substances which decay when left in nature are called biodegradable substances. They add to the fertility of the soil.
- Waste materials should be segregated before disposal.

Let's do

I. Give two examples each for the following:

1. Biodegradable substances
2. Electrical conductors
3. Poor conductors of heat
4. Non-metals
5. Alloys

II. Fill in the blanks:

1. Bio degradable substances are broken down into simpler substances by the action of _____
2. The only metal that is found in liquid state is _____
3. Materials which do not allow light to pass through them at all are called _____
4. We should dispose bio-degradable wastes in _____ coloured bins
5. The mixture of two or more metals in fixed proportions is called as an _____

III. Observe the pattern and fill in the blanks:

1. Mercury: Metal::_____:Non-metal
2. Air:_____::Wood: Opaque
3. Non-metal: Non-biodegradable::Leaves:_____
4. Brass:_____::Stainless steel: Iron

IV. Name the alloy used to make the following:

1. Body of the aeroplane
2. Doorknob
3. Medals
4. Staircase railing

V. Classify the following materials based on the type of bin they have to be disposed:

fruit peel, old cell phone, paper, vegetable wastes, cardboard, flower waste, old laptop

Green bin	Blue bin	Black bin

VI. Answer the following:

1. List any six properties of metals
2. It is good to store drinking water in a copper vessel. Why?
3. Differentiate between bio-degradable and non-biodegradable substances
4. Why do electric wires have a PVC covering?
5. How are objects classified based on their ability to allow light to pass through?
6. We make an alloy to get a material with desired properties. Explain with an example
7. Why are the handles of utensils made of plastic?

TERM 1 – SAMPLE PAPER

Max Marks : 80 **Time : 2 hours**

I. Choose the correct answer: **(4 x 1 = 4)**

1. An adult human body has
   (a) 302 bones (b) 206 bones
   (c) 270 bones (d) 365 bones
2. A body of rock or sediment that holds groundwater is called as:
   (a) Reservoir (b) Well
   (c) River (d)Aquifer
3. Ladles have wooden handle because _____
   (a) It looks grand (b) Wood is more durable
   (c) Wood does not conduct heat (d) Wood is cheap
4. The vitamin required for healthy skin and hair:
   (a) Vitamin B (b) Vitamin C
   (c) Vitamin E (c) Vitamin K

II. Fill in the blanks: **(4 x 1 = 4)**

5. The practice of spying on another country by a government, to obtain political and military information is known as _____
6. Discarded electronic devices and equipment are called as _____
7. The doctor who treats the diseases of the nervous system is called _____
8. Words, drawings or sculptures carved on a wall that gives us the knowledge of history of a period are _____

III. Rewrite the sentences by replacing the underlined word with correct word: **(3 x 1 = 3)**

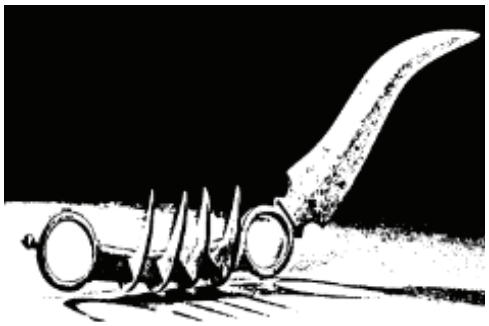
9. Bhopal is the capital of **Maharashtra**
10. Deficiency of **iodine** leads to anaemia
11. Metals are **bio-degradable** substances.

IV. Match the following: (6 x ½ = 3)

12. Shahji Bhonsle	Grand Anicut
13. Sarojini Naidu	Statue of Unity
14. King Damodar II	Shivaji's father
15. Swami Samarth Ramadas	Chand Baori
16. Karikala Chola	Spiritual guru of Shivaji
17. Sardar Vallabhai Patel	Nightingale of India
	Guddasetu

V. Identify these from the pictures given below: (3 x 1 = 3)

18.



Weapon used by Shivaji: _____

19.

_____ from Lothal

20.

Name of the step well: _____

VI. Observe the pattern and fill in: (3 x 1 = 3)

21. Rose: Layering :: Sugarcane: _____
22. Green bin: Fruit peels :: _____: Paper
23. Vitamin C: _____ :: Vitamin D: Rickets

VII. Name the following: **(4 x 1 = 4)**

24. Depth at which underground water is available.
25. Smallest bone in our body.
26. The sunshine vitamin
27. The type of joint located in the shoulder.

VIII. Give two examples for each of the following: **(4 x 1 = 4)**

28. Seeds dispersed by wind
29. Food items rich in Calcium
30. Alloys that can be used for making utensils
31. Materials that are electrical conductors

IX. Answer in short: **(7 x 2 = 14)**

32. What is CSMT? Where is it located?
33. Silver is the best conductor of electricity, but we don't use silver to make electric wires. Why?
34. Why is rainwater harvesting more important in urban areas than rural areas?
35. Why is it not possible to bend our knees in both the directions?
36. Differentiate between transparent and opaque objects
37. Show the vegetative propagation in potato with the help of a neat labelled diagram.
38. (a) How do biodegradable substances decompose?
    (b) Give examples for any two non-biodegradable substances.

X. Answer in brief : **(6 x 3 = 18)**

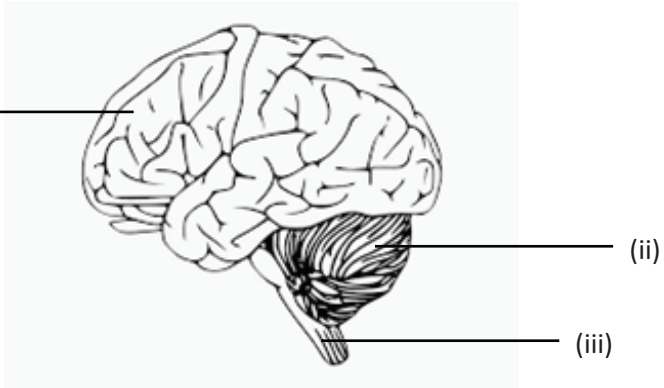
39. Ram is unable to see properly in dim light.
    (a) Based on the symptom, name the deficiency disease.
    (b) His doctor recommended that he should consume carrots. Why?
    (c) Name two more food that might help him
40. How do the temple tanks help in rain water harvesting?
41. What moral values did Shivaji uphold as a ruler?
42. (a) What is reflex action?
    (b) Which part of our body controls them?

(c) Give an example of a reflex action.

43. Write a short note on Statue of Unity.

44. (a) Label the marked parts of the brain.

(b) Mention the function of each part.



XI. Answer in detail: (4 x 4 = 16)

45. How do animals help with the dispersal of seeds? Explain with an example.

46. What were the different military strategies used by Shivaji to strengthen his army?

47. Skull is the hard bony case that protects the brain.

(a) Why is it important to protect the brain?

(b) Name the only movable joint in the skull.

(c) Which part of skeletal system protects the heart?

(d) State the main function of the spinal cord

48. Explain the causes that led to the Salt Satyagraha

XII. Mark the following on a Political Map of India: (1 x 4 = 4)

49. On the political map of India, mark the states in which the following are located

(a) Inamgaon

(b) Bhavani Sagar Dam

(c) Cochin port

(d) Statue of Unity

Political map of India

Map showing the major rivers of India

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.

ISBN : 978-81-971186-4-7