

What this book contains...

Welcome to the first volume of Science Courseware for grade 4. This Interactive Curriculum Book contains different concepts, as well as activities and experiments related to them, and skills for students to learn. The book follows an enquiry-based approach to learn science. It is often embedded in students' diverse experiences and active investigation, which they pursue through a variety of tasks.

The Interactive Curriculum Book has important additional features. Every unit starts with a Concept Cartoon, a well-established, research-based tool that probes students' ideas (conceptions and misconceptions) about the theme. In the class, the teacher uses these misconceptions to build actual knowledge through raising relevant questions and carrying out various experiments. Each unit is summarised with the help of a Visual Concept Map (VCM). The VCM, visually and effectively, shows interconnections between different concepts and skills that students will learn in a particular theme. Students can use the VCM to revise, strengthen and clarify concepts and skills quickly.

The Interactive Curriculum Book deliberates upon the following themes:

FOOD

In this theme, as a part of an experiment, students eat/drink different food items, pay attention to their tastes and discuss what they experience after having them. They also get to learn about the taste buds in the tongue. They learn about the types of teeth and their functions; for example, molars are used for chewing and canines for tearing the food. They learn about the importance of keeping their teeth and mouth clean, and ways to do so. Further, they draw correlations between the teeth structures and the food habits of different animals.

Building upon hitherto learnt food habits, students learn about the food chain of a particular habitat. With this, they get to know about the interdependence in an ecosystem—plants as producers, and herbivores and carnivores as consumers.

PLANTS

The theme builds on students' previous knowledge and experiences of plants, and engages them to explore the various parts of plants like stem, leaves, roots, flowers and fruits. Through multiple activities, observation and recording of data, they investigate the role of a stem in transporting water from soil to different parts of the plant.

The theme builds a broad understanding of different plants in three kinds of habitats, namely desert, water and mountain. Students learn about the specific adaptations that these plants undergo in order to survive in their respective habitats. Comparing plants belonging to different habitats further refines their understanding of plant adaptation.

WATER

In this theme, students focus on water pollution, its causes and ways of dealing with it. They learn about the impact of water pollution on humans and animals; especially, diseases like diarrhoea, cholera and polio in humans. The theme also focuses on the ways of preventing water pollution by generating awareness about it. Students make a poster to create awareness about water-borne diseases and discuss the latter. They also learn the various methods of water purification.

ANIMALS

In this theme, students explore the physical features of different animals and the significance of these characteristics for their survival. They explore the details of the skins of various animals. It's a fun activity and connects extremely well with the concept of adaptation. They learn about specifically developed parts of an animal body that act as sense organs, some of which are used by humans as well; for example, dogs have a strong sense of smell. They explain the term 'adaptation' with regard to behavioural and structural changes in animals that ensure their survival. Students learn about animals living in groups, or pairing with another animal, as part of their survival.

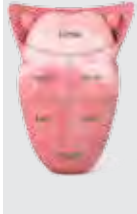
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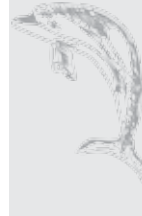


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Icons



Play brings richness to children's experiences. These games engage children physically and help them learn various new concepts.



By doing the given task, children engage in multiple activities which develop various skills and concepts.



Children love to sing songs and poems. While doing so, they also learn vocabulary, expressions and values.



Children talk about a given situation. Such a conversation enables them to reflect on, articulate, share and listen to their thoughts, feelings and learning. In this way, they develop the skill to connect with other people through a meaningful conversation and exhibit their thinking process.



Children draw to communicate their thoughts and feelings. They use drawing as a medium to share their visualisation. Some of these tasks also strengthen their fine motor skills and eye hand coordination.



Children watch educational videos. These audio-visual experiences help them acquire knowledge about the world in an easy, joyful way.



Children listen to various stories and poems. It develops sensitivity and enhances attention.



In these tasks, children look at the details of various things, people, animals, etc. This develops in them the skill of observation, which is one of the most powerful skills of learning.



In these tasks, children reflect upon what they have studied. Reflecting on their experience and the activity brings a new understanding and fresh perspectives. This is the key to learn from any experience or activity they have done.



We give some facts that are relevant to the concept being studied. Children read them to acquire more knowledge on the topic they are learning.



Children write down their thoughts about a given situation. Writing helps them express their thoughts coherently. It also makes their thoughts visible to others.



These tasks are designed to improve individual thinking and problem-solving skills. These are often given with some instruction and/or a problem that needs to be solved. This helps children learn to conceptualise on their own.



Children engage with varieties of fiction and non-fiction texts. The texts allow the readers to see rich vocabulary and ease of use in the language. Through language students also derive or attain clarity of concepts.



Revision tasks help children recapitulate their learning. These also strengthen their learning for later access and use.



These tasks include homework, which is mostly an extension, practice or application of what has been taught in the class. Sometimes, opportunities are given to explore a new concept.



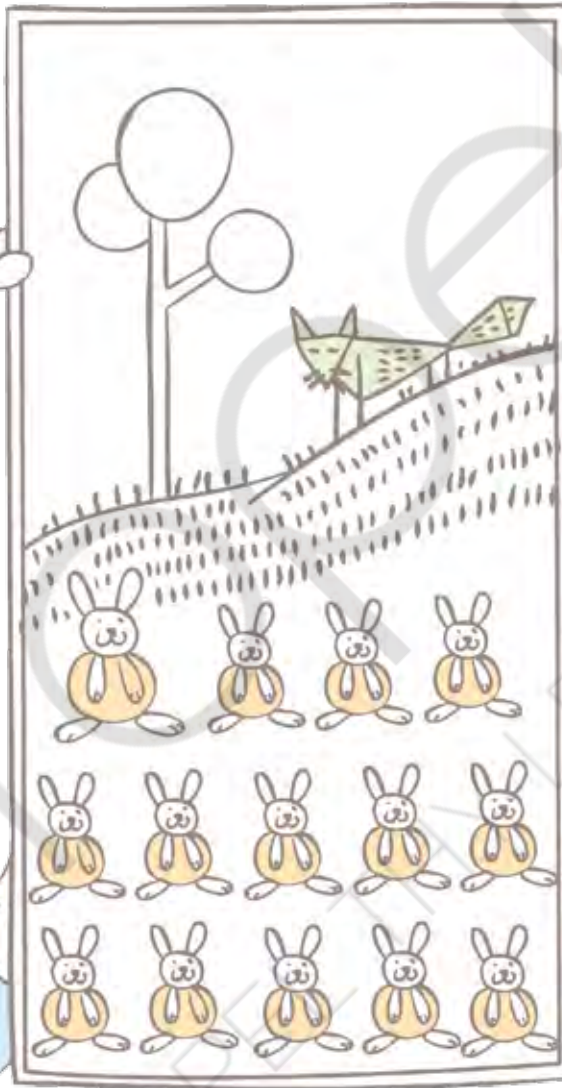
These notes help parents recognise the objectives of the tasks children are doing. They also enable the parents to know how the tasks help the child in his/her learning. In this way, they can contribute actively to their child's learning.



FOOD

There are always more rabbits than foxes so there is enough food for the foxes.

It is because the rabbits do not need to eat much.



It is because the rabbits produce more babies.

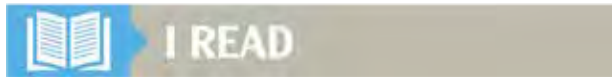
It is because the foxes are at the top of the food chain so they are fewer in number.

Whom do YOU agree with?

What's in Your Mouth?



What do you use in your mouth to eat food?



In our previous grade, we learnt that we get food from two sources—plants and animals. Food gives us energy, makes us strong and protects us from diseases. People eat different kinds of food items in different regions. These food items are prepared in different ways and eaten in various combinations.

When we chew food, we are able to taste it better. Our teeth and tongue help us in chewing.

Tongue and Taste



Our teeth play an important role in eating food. While eating, our tongue plays the role of tasting.

Many times you say, 'I don't want to eat this.' When asked why, you would often reply, 'I don't like its taste'. So, it is your tongue that tells you about the taste of the food. Now, let's taste a few things and describe their taste.

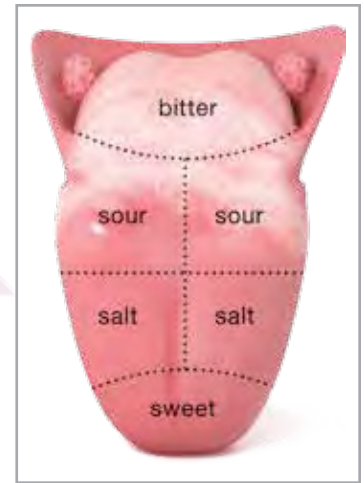
| Food item | Chocolate | Orange | Mango | Lemonade | Radish |
|-----------|-----------|--------|-------|----------|--------|
| Taste | | | | | |

1. Partner with one student in the class and read his/her response.
2. Are the responses written by you and your partner the same? Why do you think so?

Different Taste Buds

It has been believed, up until recently, that the tongue has specific zones to taste a specific flavour.

Let us use the taste map of the tongue and test its validity. Note the taste zones on the tongue.



Answer the following questions in your note book.

1. Take a small amount of salt and put it on the tip of your tongue. This is considered to be the zone for sweet taste. Now, write what you feel.
2. Take a small amount of sugar and carefully put it on the back of your tongue. This is considered to be the zone for bitter taste. Write what you feel.
3. Take a small piece of karela (bitter gourd) and put it in the middle or front part of your tongue. Write what you taste.
4. What do you think about the belief related to the specific zones on the tongue for different tastes? Check with your partner if he/she also had the same experience.



MISCONCEPTION ALERT

Your mouth smells when you don't brush.

It is true that germs (tiny invisible creatures) living in your mouth (on teeth, gums and tongue) cause bad breath. But this is not necessarily because you don't brush. Bad breath can happen if your mouth is dry. This is why a lot of people have bad breath in the morning because their mouths go dry during sleep.

Saliva acts as a mouth rinse as it contains a substance that kills germs. When the mouth becomes dry, germs have a better environment to grow and produce more waste—all of which leads to bad breath.



Teeth



I WRITE

1. Observe your teeth carefully with the help of a mirror and draw their structure.

A large, empty rectangular box intended for a student to draw the structure of their teeth. A faint watermark reading 'PROPEL THY LEARNING™' is visible across the box.

2. How do our teeth help us in eating?


3. Count and write the number of teeth you can see in your mouth.

4. Do all the teeth look similar? If not, what could be the reason for this?

We have different types of teeth in our mouth. They have different structures so that they can perform different functions when we eat food.

 I CONNECT

Why do we have different types of teeth?

 I EXPERIMENT

What you need:

Apple, chapatti, sugarcane

What you do:

Slowly eat each item you have brought and observe which teeth are being used to bite, tear, crush or chew the food. Fill in the following table.

| Food item | Which teeth are being used? | What exactly are these teeth doing? | What is the structure of these teeth that helps in different activities? |
|-----------|-----------------------------|-------------------------------------|--|
| Apple | | | |
| Chapatti | | | |
| Sugarcane | | | |

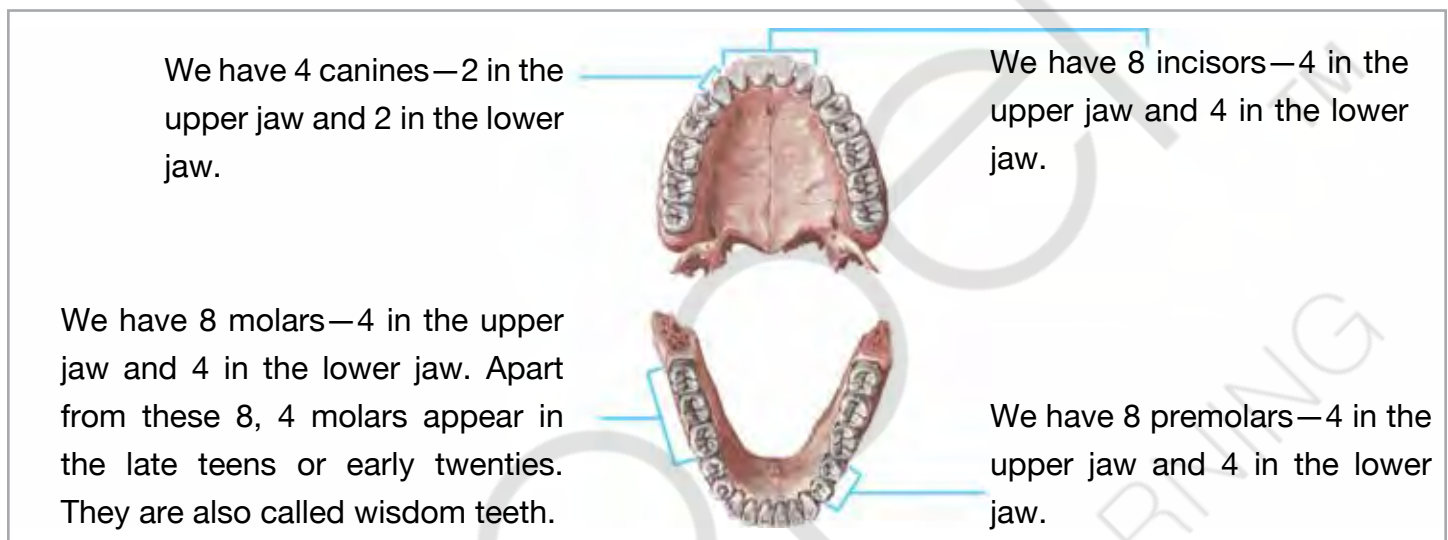
What relationship do you see between the different structures of teeth and their functions? Describe.



Types of Teeth

Teeth are very important to us. A human adult has 32 teeth in his/her mouth.

These teeth are of 4 types, each of which plays a special role. Let's read about them.



Teeth are designed differently so that they can perform different tasks to help us eat our food. Now, look at their features.

1. The teeth at the front of our mouth are the incisors. These can bite lumps of food. You have seen how the apple left behind showed a clean cut.
2. The canines are pointed teeth used for tearing and ripping food that cannot be normally done with the incisors. You have seen them more prominently in dogs and cats. When we eat a tough piece of meat, or even a toffee bar, we automatically use canines for such foods.
3. Finally, the premolars and molars grind and crush food. Remember how you chewed the chapatti (or the gum that you often enjoy), with your mouths closed! You must have noticed how your jaws were grinding rhythmically. You can simulate this action by putting a piece of bread between two cheese graters and rubbing them together, making the bread break up into small pieces. You must have noticed how your back teeth moved up and down; grinding backwards, forward and sideways so that the food gets converted into a paste.

Uses of Different Types of Teeth

Incisors are the eight large, flat teeth with straight edges that are in the front of the mouth. They are shaped like tiny chisels, with flat ends. They are used for cutting and chopping food; for example, biting into an apple. Animals use them for grasping or picking, both in feeding and grooming.



Incisors



Canines

The sharp and pointed teeth beside the incisors are called canines. Because these teeth are pointed and sharp, they help tear food. Carnivores, whose diet consists mainly of meat, use them frequently for stabbing and holding their prey. They often have large extended canines for this purpose. Some herbivores (animals who eat only plants, e.g., sheep) have no canines. Humans are considered omnivores because we eat both plants and meat, and thus have all types of teeth.

Next to the canines are the premolars. They vary considerably in shape and size, from species to species. Their shape is different from both incisors and canines. Premolars are bigger, stronger and have ridges, which make them perfect for crushing and grinding food.



Premolars



Molars

The teeth at the back of the mouth are molars. Children have eight of these, four in upper jaw and four in lower jaw, but adults can have twelve molars. They are wider and stronger than premolars, and have more ridges. They are used for grinding the food, making it easier to swallow and digest.



Answer the following questions.

1. Observe the incisors, canines, premolars and molars in your mouth and write which ones are missing.

2. Which teeth are used for chewing and grinding?

3. Which teeth are used for biting and cutting?

4. Which teeth are used for ripping and tearing?



PRACTICE AT HOME

1. Find an elderly person who is missing some teeth. Ask him/her which of his/her teeth are missing. Make a diagram of his/her teeth. Now, ask what difficulty he/she goes through while eating food. Describe why he/she faces that problem.


2. Visit a dentist with your family. Ask him/her about the types of teeth in our mouth and how they make a model of teeth.

Make a model of teeth with the help of clay and label it. You can take the help of your parents. Bring your model to the school and show it to your classmates.

 I TALK

Rashi studies in Grade 4. She knows how important teeth are to us. One day, she experiences pain in one of her teeth. She holds and shakes it to ward off the pain. Oops! The tooth comes out in her hand! Now, she is very worried.

Should Rashi be worrying so much about the loss of her tooth? Explain your answer with a reason.

 I READ

There are two sets of teeth that a human being has during his/her lifetime.

1. **Temporary set of teeth:** We have a temporary set of 20 teeth that appears between 6 and 30 months of age. These teeth begin to fall one by one when you reach 5 years of age. New teeth grow in their place. The temporary teeth are also called milk teeth.
2. **Permanent set of teeth:** This is a set of 32 teeth that replaces the temporary set of teeth by the time we reach 20 years of age. The teeth from this set start falling off naturally by the age of 50–60. Once fallen, no new teeth grow in their place.

Thus, dentists prescribe artificial teeth when the permanent teeth fall off.

 PRACTICE AT HOME

1. In your own words, explain to Rashi why she doesn't need to worry about the loss of her tooth.

2. Divij is 25 years old. He met with an accident and lost his front teeth. Do you think he will get new teeth in their place? Explain your answer.
-
-



MISCONCEPTION ALERT

'It does not matter if my temporary teeth rot!'

You might feel that it is fine if your temporary teeth rot because they will anyway be replaced with permanent teeth. But this can get you into trouble. If you don't take care of your teeth, your teeth will fall but you might also get gum disease. It can even damage your adult teeth, which are still very small but hidden under the temporary teeth.



FUN TO KNOW

Sharks lose their teeth every week. However, these teeth grow again. This means that a shark can have over 20,000 teeth during its lifespan of 20–30 years.



I ACT

Fourteen-year-old Tanya loves to eat different kinds of food. For the last week, she is unable to eat anything because she has toothache.

1. What might have happened to her?
-
-

2. In this condition, what would you suggest to her? Why?

3. Have you ever had a toothache? What did you do to stop the pain?

Tanya's friend Rihana suggests her to visit a dentist. After examining Tanya, the dentist tells her that she has cavities which are causing the pain in her teeth.

???

FUN TO KNOW

Today, caries remains one of the most common diseases throughout the world. Dental caries is also known as tooth decay or cavity. It is an infection that damages the teeth. It is a result of the production of acid by germs that survive on food particles accumulated on the surface of the teeth.



What can we do to prevent caries?

I EXPLORE

Find out at least two more diseases related to teeth and their causes.

| Disease | Cause |
|---------|-------|
| | |
| | |



Teeth Care

Teeth are a very important part of our body, and their care is also very important for us.

1. According to you, what care is required for your teeth and why?

2. What do you use to take care of your teeth?

3. What did your grandparents use to take care of their teeth when they were young?

Tanya’s mother always brushes her teeth. In fact she has been brushing her teeth thrice a day, applying force to clean her teeth well. For the last two weeks, she has been feeling pain and sensitivity in her teeth. When she consulted a dentist, she was shocked to hear that she was using a wrong method to brush her teeth. This had resulted in the erosion of the outer covering of her teeth, making them sensitive to cold or hot substances. The dentist then told her the right way to brush. He also showed a video to help her understand the method of brushing properly.



Let’s watch a video to see how to brush our teeth.



Mastering the Brushing Technique

Take a small amount of toothpaste on your toothbrush. Applying too much toothpaste will make you spit it too early. Brush your teeth gently. In case of sensitive teeth, use a toothpaste made for sensitive teeth. Also, use a soft brush.



Set your bristles at the gum line, slightly tilted as shown in the picture.

Gently brush with a short, vertical or circular motion. Don't brush across your teeth. Spend at least three minutes brushing. Work your way around your mouth so that you clean every tooth, spending about 12–15 seconds on each. If it helps, you can divide your mouth into four quarters: top left, top right, bottom left and bottom right, and brush them one after the other.



Position the toothbrush as shown here so that the bristles rest on top of your bottom molars. Work the toothbrush in an in-and-out motion, and move from the back of your mouth to the front. Repeat these actions on the other side of your mouth. When the bottom teeth are clean, flip the toothbrush over and work on the top molars.

Tip the toothbrush so that the head of the toothbrush points towards your gum line, and brush each tooth. Dentists report that the most commonly skipped area is the inside of the lower front teeth, so don't forget them.



After you've cleaned your teeth, use the bristles of your toothbrush to gently clean your tongue. (Don't press too hard or you'll hurt your tongue.) This helps get rid of bacteria on your tongue and keep bad breath away.

Rinse your mouth. If you choose to rinse after brushing, take a sip of water from a cup, or cup your hands under the faucet. Swish it around in your mouth and spit it out.



Hold your toothbrush under running water for a few seconds to remove any germs or leftover food from it. If you don't rinse the toothbrush properly, you can introduce germs from it into your mouth the next time you use it. Place your toothbrush to dry. Drying prevents the growth of any germs on the bristles of the toothbrush.

Animals: Different Diets, Different Teeth









I ACT

In your notebook, list the names of animals that are frequently seen in your surroundings. Together with your partner, look at all the names and think how these animals are similar or different in terms of what they eat. List these categories. Segregate these animals according to their category.



I EXPLORE

Using your previous knowledge, write what these animals eat.

| | | |
|---|---|---|
|  |  |  |
|  |  |  |

Let us look at some animals to see how their teeth are suited to consume the kind of food they eat.



1. What are the main features of the teeth of these animals?

2. What connection do you see between the structure of their teeth and their food? Describe.



Carnivores—animals that eat only meat—need teeth for killing prey and ripping apart their flesh. Just about all carnivores have fangs: long, pointed canine teeth. Wolves and dogs; lions, tigers and cheetahs; foxes; bears; and even insect-eating rodents have fangs.

Grazing (feeding on grass and small plants) and browsing (feeding on leaves or twigs) animals have special teeth to tear plant tissue and grind it down before they swallow it. Grinding teeth are wide and flat. They look like human molars, but are much more powerful. A deer's grinding teeth are exceptionally wide. They have curved ridges for cutting up tough plant fibre. A deer can even chew up tree twigs. Just like many browsers, deer have no top front teeth, as they don't need them. A deer uses its powerful tongue to hold food against the roof of its mouth. Then it slices through the plant tissue with its sharp bottom front teeth. Its tongue moves the food back, towards the grinding molars. Hence, plant-grinding animals have broad, flat teeth.

Squirrels have strong, sharp front teeth that can chip away the hard shell of most nuts. Their paws can easily hold onto a nut as they nibble it. Parrots have sharp, strong beaks for breaking nutshells.



We know that bears are omnivores. But some species of bears like the giant panda are herbivores.



Animals and Their Teeth

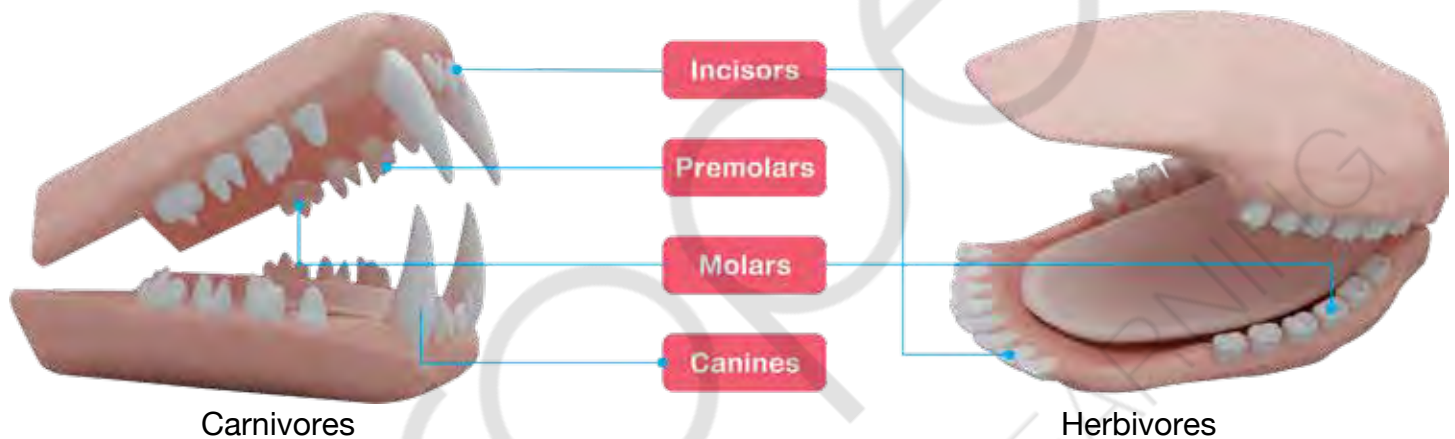
Like humans, animals also have teeth which direct their food habits.

1. Which type of teeth does a lion need the most? Why?

2. What kind of teeth does a cow need the most? Why?

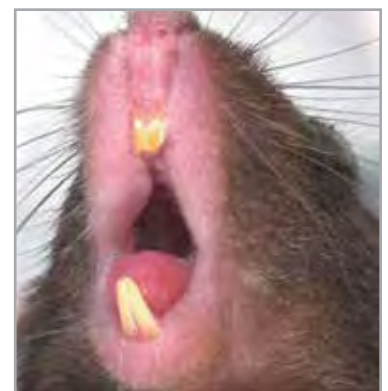
Animals that eat plants are called herbivores. Animals that eat other animals are called carnivores. Animals that eat both plant and other animals are called omnivores.

Look at the difference between the teeth structure of carnivores and herbivores.



?? FUN TO KNOW

If mice didn't gnaw, their teeth would outgrow them! Yes, a mouse's teeth never stop growing. That's why they keep gnawing constantly.



Children need to understand that the teeth structure of animals as well as humans supports the kind of food habits they have. Each type of teeth in this structure performs a specific role in eating food. You can help your child observe the structure of teeth in his/her mouth and of his/her pet animal too. Ask him/her to relate it with the food habits of the pet.



Carnivores

These animals have sharp and scissor-like teeth. Their front teeth bite and hold on while their long canine teeth tear into the prey. Their molars are used for slicing rather than chewing because they mainly swallow their food in big chunks.



Herbivores

They have lots of molars. These back, flat teeth are used for grinding branches, grasses and seeds. They use their front teeth like pruning shears to clip leaves and stems.

Omnivores

Animals such as otters and bears eat both plants and meat, so they have a combination of sharp front teeth and grinding molars. Humans also have such teeth whether they eat meat or not. Open your mouth and look into the mirror. Spot these teeth.



It is possible to learn about extinct animals from their teeth. Many dinosaur teeth have been discovered. From these teeth, scientists have been able to tell the type of food dinosaurs ate.





I PRACTISE

In the following pictures, identify the type of animal (herbivore, omnivore or carnivore) on the basis of their teeth.



Food Chain

We depend on plants to a large extent to meet our need for food. We also know that plants alone make their own food in the presence of sunlight, air and water.

I TALK

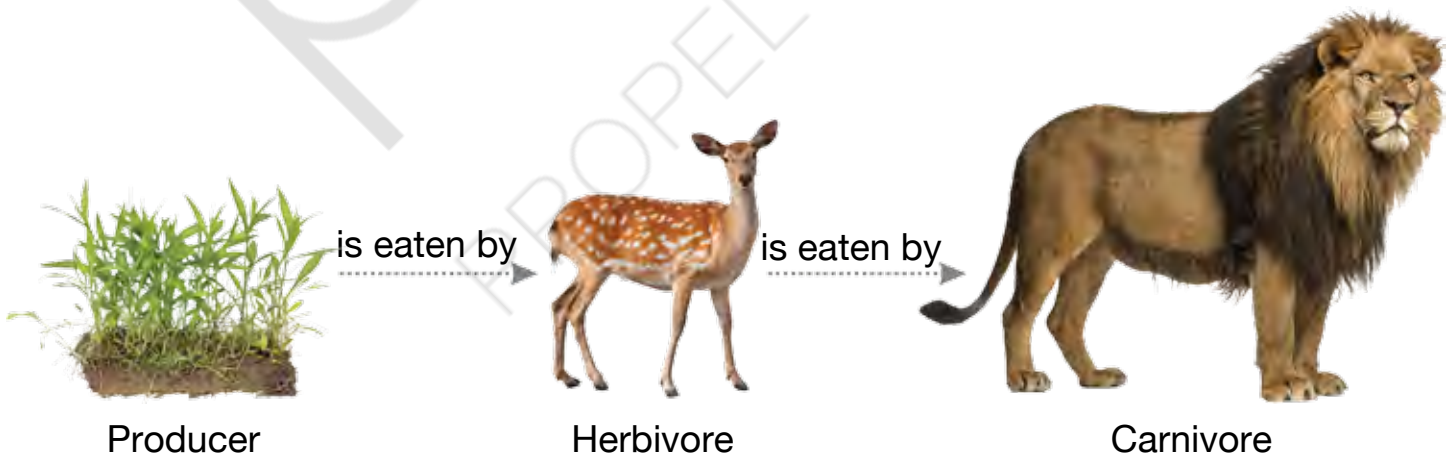
1. Where do animals get their food from?
2. Do all animals eat the same kind of food? Give examples.
3. In the context of food habits, what is common between animals and humans?

I WRITE

How are plants, animals and humans interconnected with respect to food?

I READ

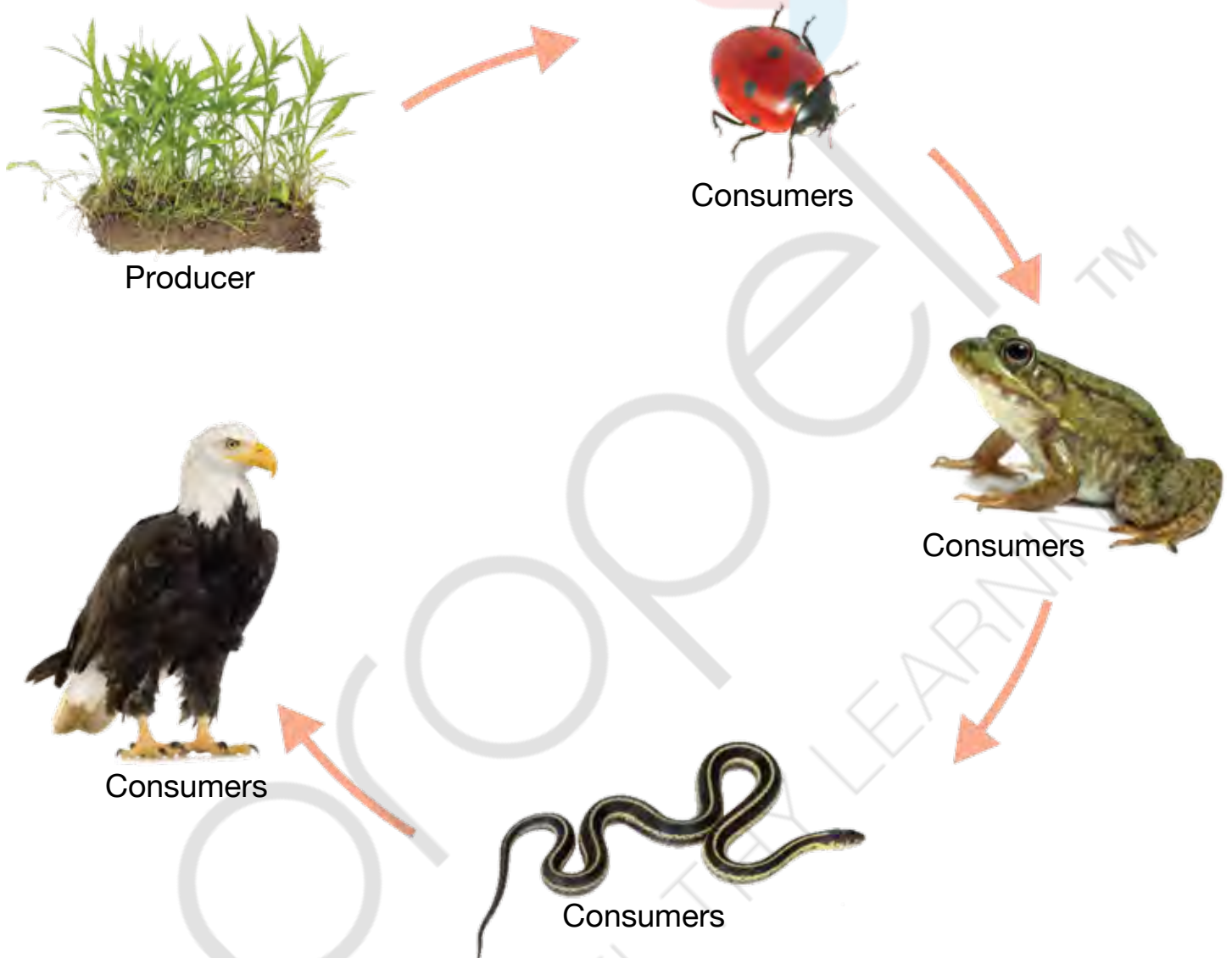
Plants make their own food by the process known as photosynthesis. They are thus referred to as producers. Animals and humans depend on plants or other animals for their food. Thus, they are referred to as consumers. There are different types of consumers. Herbivore is a plant eater, also called primary consumer; carnivore is a flesh eater, also called secondary consumer; and omnivore is the one who eats both plants and flesh. Producers create energy using the sun; this energy is transferred to other animals who eat them. Thus, energy received from the sun is transferred step by step from plants to herbivores and then to carnivores.



Thus, animals, plants and humans depend on each other to meet their food requirements. Here is a simple example to show this interdependence.

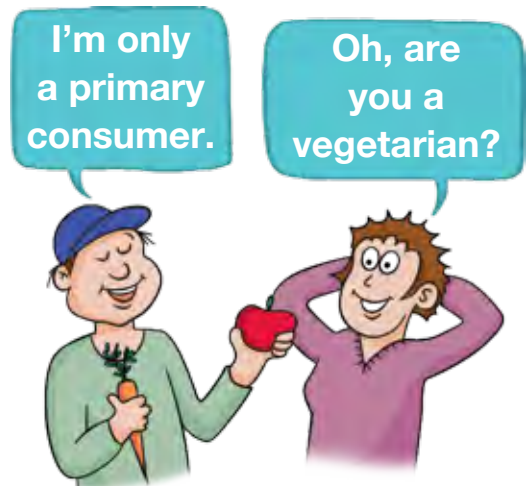
Grass is eaten by **beetle** is eaten by **frog** is eaten by **snake** is eaten by **eagle**

The given diagram represents how plants and animals depend on each other for food. This is a simple food chain that exists in a grassland. Plants make their own food.

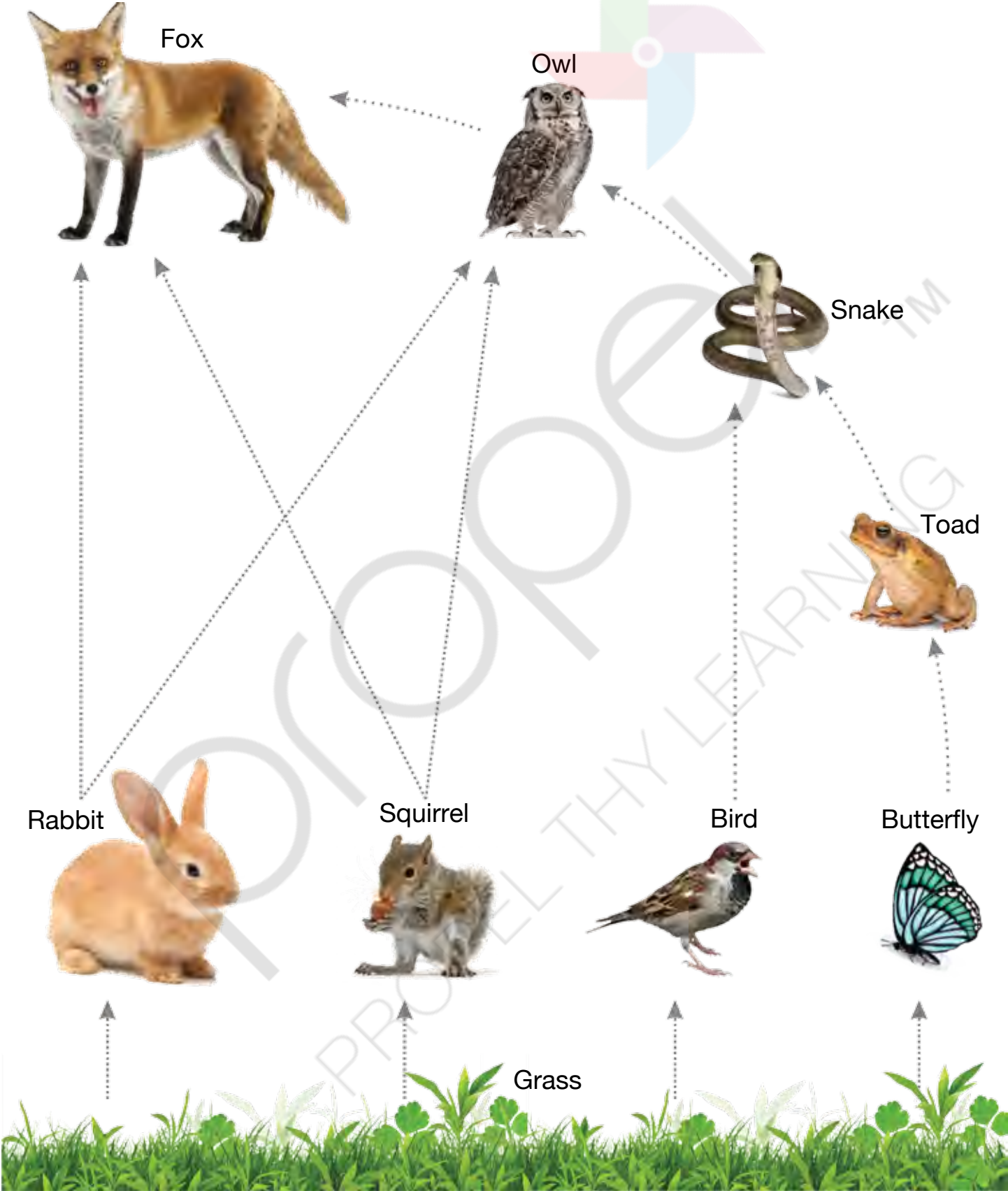


This series of organisms, where one organism eats up the other to survive, is known as a food chain.

In other words, we can say that plants are consumed by herbivores. Herbivores are eaten up by omnivores or carnivores. Both of these can be eaten up by carnivores.



Label the producers, herbivores, carnivores and omnivores in each of the following food chains. Many food chains connected together form a food-web.



Are they interconnected?

Given below are some participants of a food chain. Create as many food chains with them as you can in the given space. Use your notebook, if this space is not sufficient.

plant | grasshopper | deer | tiger | lizard | rabbit | hen | human
hawk | dog | squirrel | sparrow | fox | mice | snake | spider

PROPEL THY LEARNING™



Children have read about producers, herbivores, carnivores and omnivores. In this grade, they explore the relation between different animals and their food habits. They also explore the concept of a food chain. These will be further developed in higher grades.



I PRACTISE

- Using the given plants and animals, make a food chain (using arrows) that will be visible at a farm.



Robin



Spider



Paddy



Grasshopper

- Using the given plants and animals, make a food chain (using arrows) that will be visible in a pond.



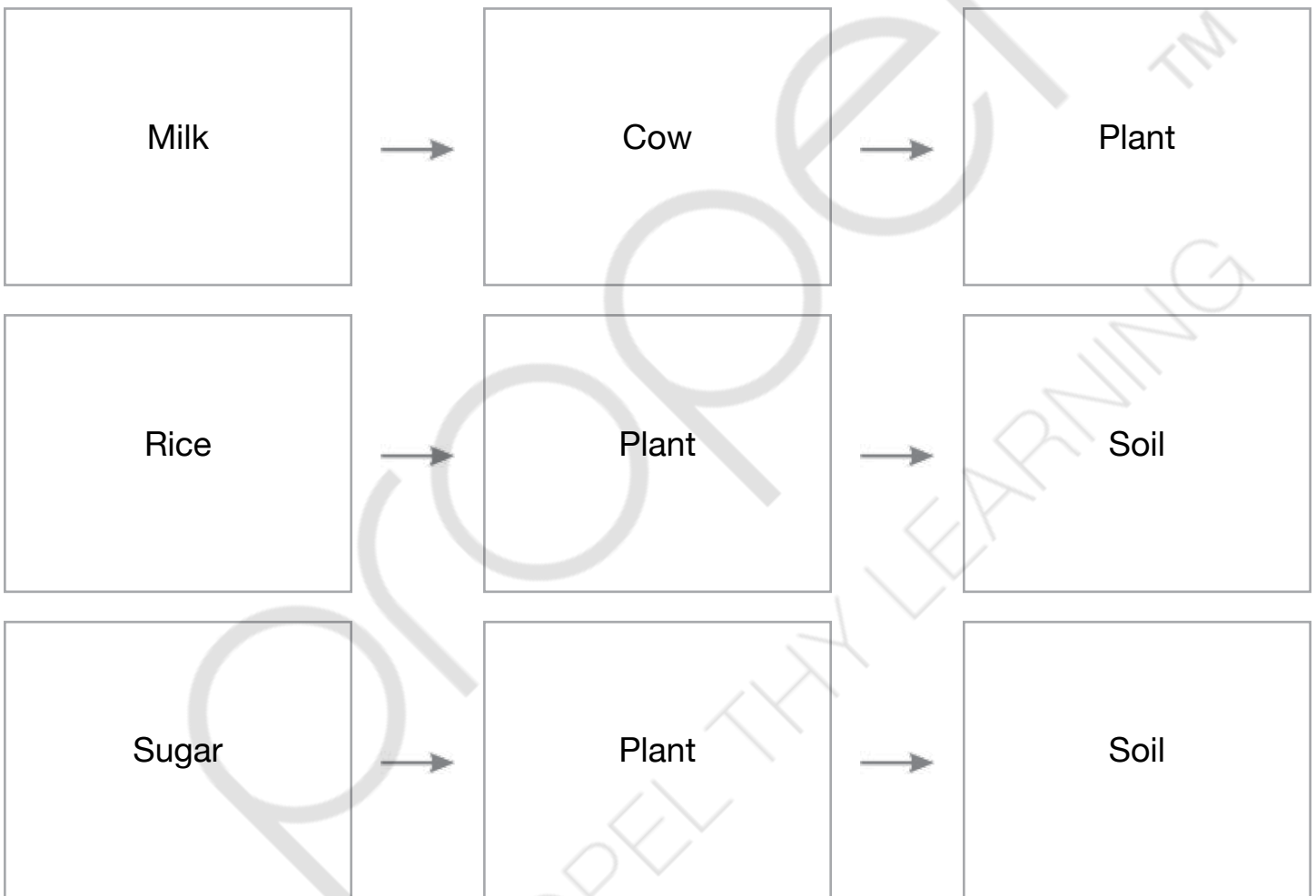


PRACTICE AT HOME

We eat food from many sources. We eat fruits, vegetables, meat, dairy products, grains and sweets. Most items that are part of our daily diet are made from natural sources such as plants and animals. Each of these items needed energy from the sun and was first produced by plants. For example, wheat plants get their energy to grow from the sun and the nutrients from soil and water. Cows eat these plants and get energy. All these are part of a food chain.

Direction: In your notebook, name one of your favourite foods. Write three ingredients of that food item. Now, trace back the sources for each of these ingredients. One example has been done for you.

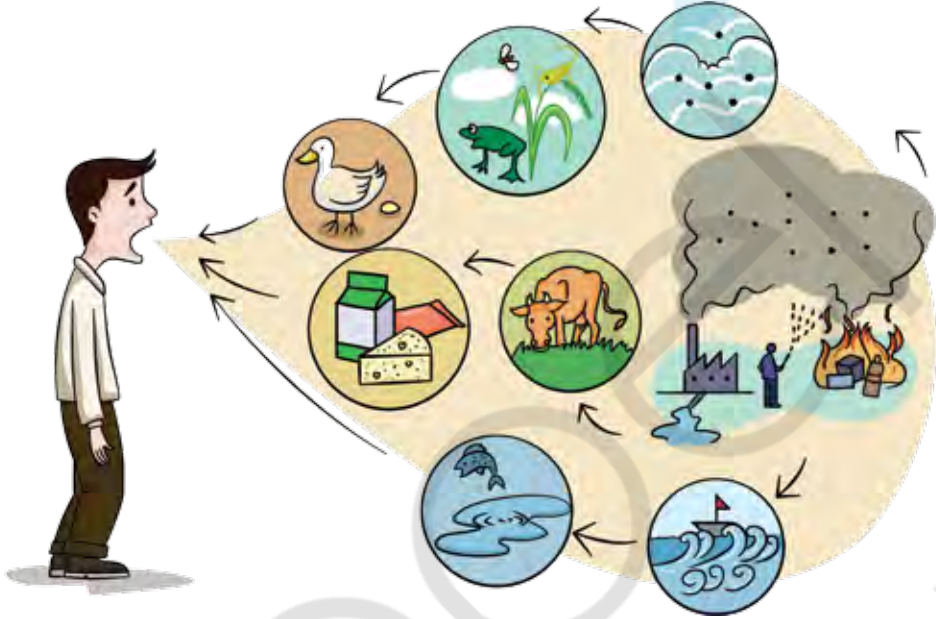
Favourite Food: Kheer



Is there any ingredient that doesn't come from something that grows naturally? Write its name and explain where it comes from.

What happens when one organism in a food chain simply disappears? It may have died or run away to another place. How are the rest of the organisms affected by its disappearance? What if two organisms disappear? These are the questions scientists are asking today as the climate is changing because of pollution or other problems caused by humans.

Study the diagram and answer the questions that follow.

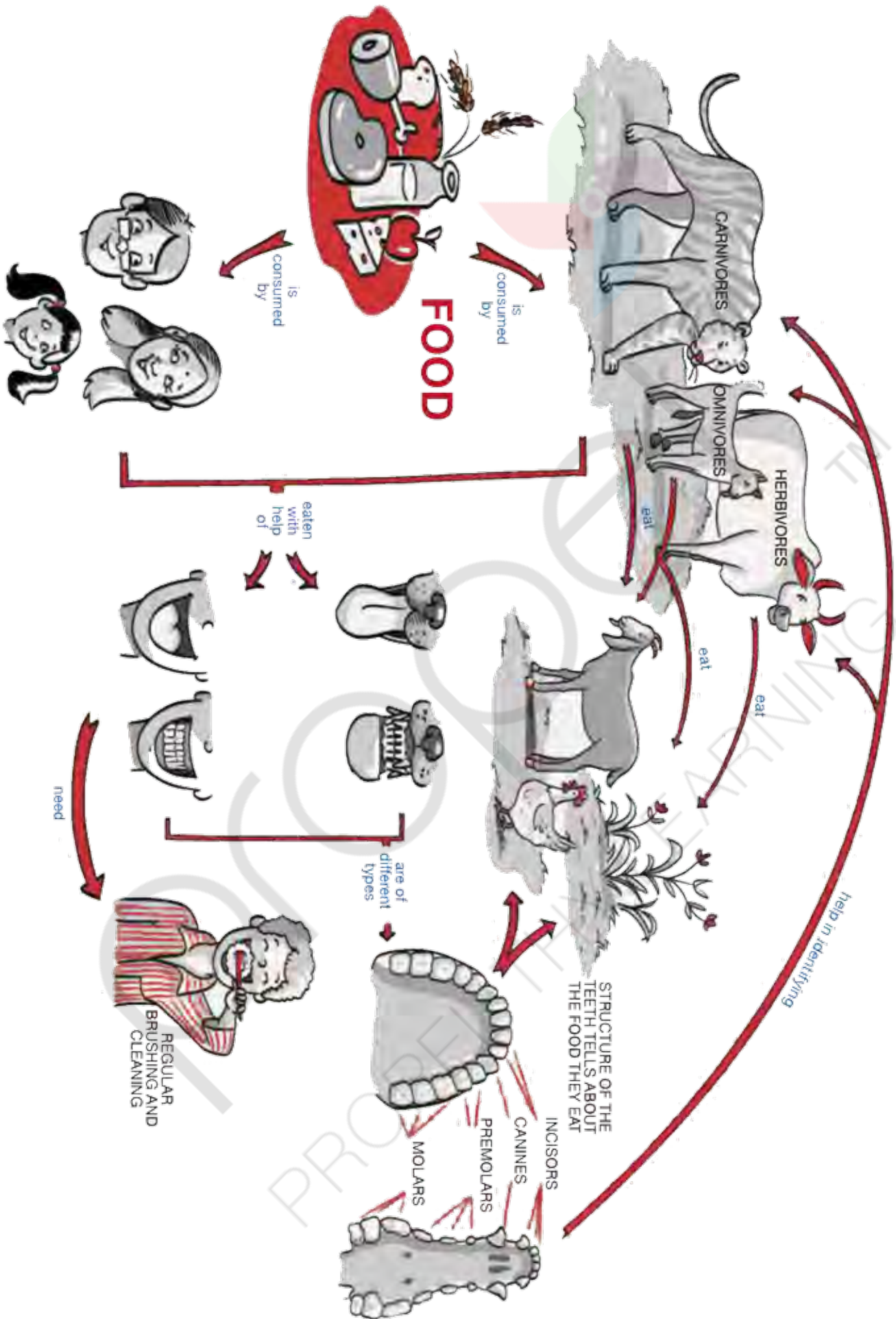


1. Suppose the wastes from the factory pollute the river badly. Predict what might happen to the small plants that grow in, and on the banks of the river?

Then what will happen to the insects and other animals that live on those plants? And fish? And humans?

2. If a large group of foxes or hawks came to an area and began eating all the frogs there, what might happen?

3. If the place was invaded by meat-eating *rakshasas* who ate up all the animals, what might happen to the non-vegetarian humans?





PLANTS

Where will you plant your saplings, students?

Let us pour milk with Horlicks into it. It will become strong.

This is so weak... it falls on the ground.

This needs light. I will put it on the window sill.

This is water lily. Let us put it into the pond.

But it will drown and die.

Good idea. You can watch it without having to get up.

ha... The big mouse in the class will eat it.

What do you think about each plant?

Stem

Parts of a Plant



What are the different parts of a plant?



Let's go to the garden and observe plants.



What are the different parts of a plant that you can see?



Part 1

What you need:

A white flower with a long stem, blue and red ink, a knife, two glasses, tape and water.

What you do:

1

Take the flower and vertically slice the stem in halves till a point.

2

Wrap a piece of tape around the stem just above the split part to prevent it from splitting any further.

3

Fill two glasses with water. Add blue ink in one and red in the other. Place the halves of the stem inside them.

4

Observe the flower petals after 15 minutes or so.

What do you observe?

Part 2

What you need:

- Jar or glass of water
- A knife
- Red ink
- A stalk of celery

What you do:

1. Put a few drops of red ink in the water.
2. Cut off the bottom inch of the celery stalk.
3. Place the celery in the water. Let it sit for 3-4 hours.



Observe:

1. Describe what you see.

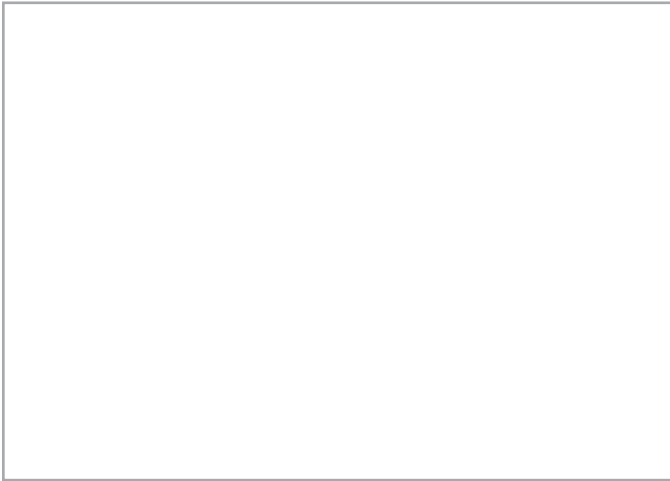
2. Cut the stalk longitudinally. Look at the cut side. What do you see?

3. What do you think carried the water up the stalk?

4. What would happen if the stem of a plant breaks? Why?

From this activity, we see that water moves up the stem. Water and nutrients from the soil are absorbed by the roots and transported by the stem to the leaves and other parts of the plant. The stem also carries food from the leaves to different parts of the plant.

Use your magnifying glass to observe the stem of a plant. Be careful of any thorn it might have. Draw it in the empty box given below as clearly as possible.



Stem of your plant



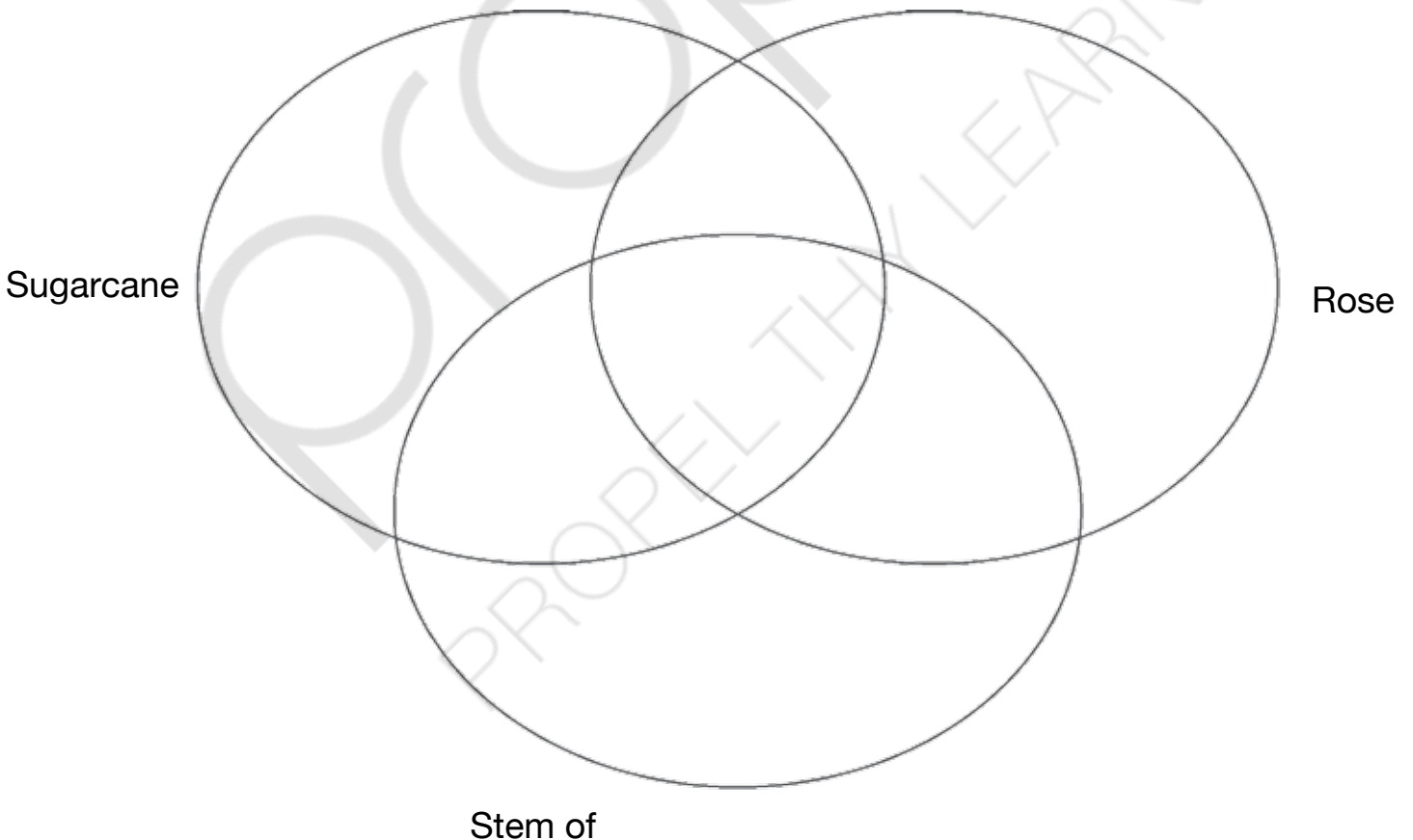
Stem of sugarcane



Stem of rose

Observe the stems of a rose and sugarcane along with the one you have drawn.

1. What are the main features of these three stems?
2. Write the similarities and differences between the three stems in the figure given below. Take help from your teacher if required.





I READ

Stems of most of the plants are above the ground. Different plants, however, have different kinds of stems. Some have tender stems; for example, herbs; some have woody stems; for example, shrubs; and some have hard and tough stems; for example, trees. Even though stems may have different structures in different plants, they perform the same function. They hold branches, leaves, etc., and act as the channel for the transportation of water and food materials.

As you see in the picture here, the stem has ring-like structures that hold buds. These buds grow into leaves, branches or flowers. This ring is called a **node**. The segment of the stem between two nodes is called an **internode**. You will notice that these internodes may not be equal in length.



PRACTICE AT HOME

In your notebook, draw the stems of three different plants. Label the nodes and internodes in them. Name these plants.



I CONNECT

Who makes food for plants?



I OBSERVE

Leaf

Use a magnifying glass to see the details of the leaves of your plant. Always keep your head still, and move the lens to and fro to focus on the part of the plant you are looking at. Examine the two sides of a leaf and notice their similarities and differences. Trace the leaf in the given space.

PROPEL THY LEARNING™



I WRITE

1. What is the shape of the leaf?

2. What colours can you see in it?

3. Are there any lines on the leaf?

Describe what they look like.

4. What does the edge of the leaf look like?

Observe the given pictures and describe what you see in them within your group. Also, discuss what could be their function.



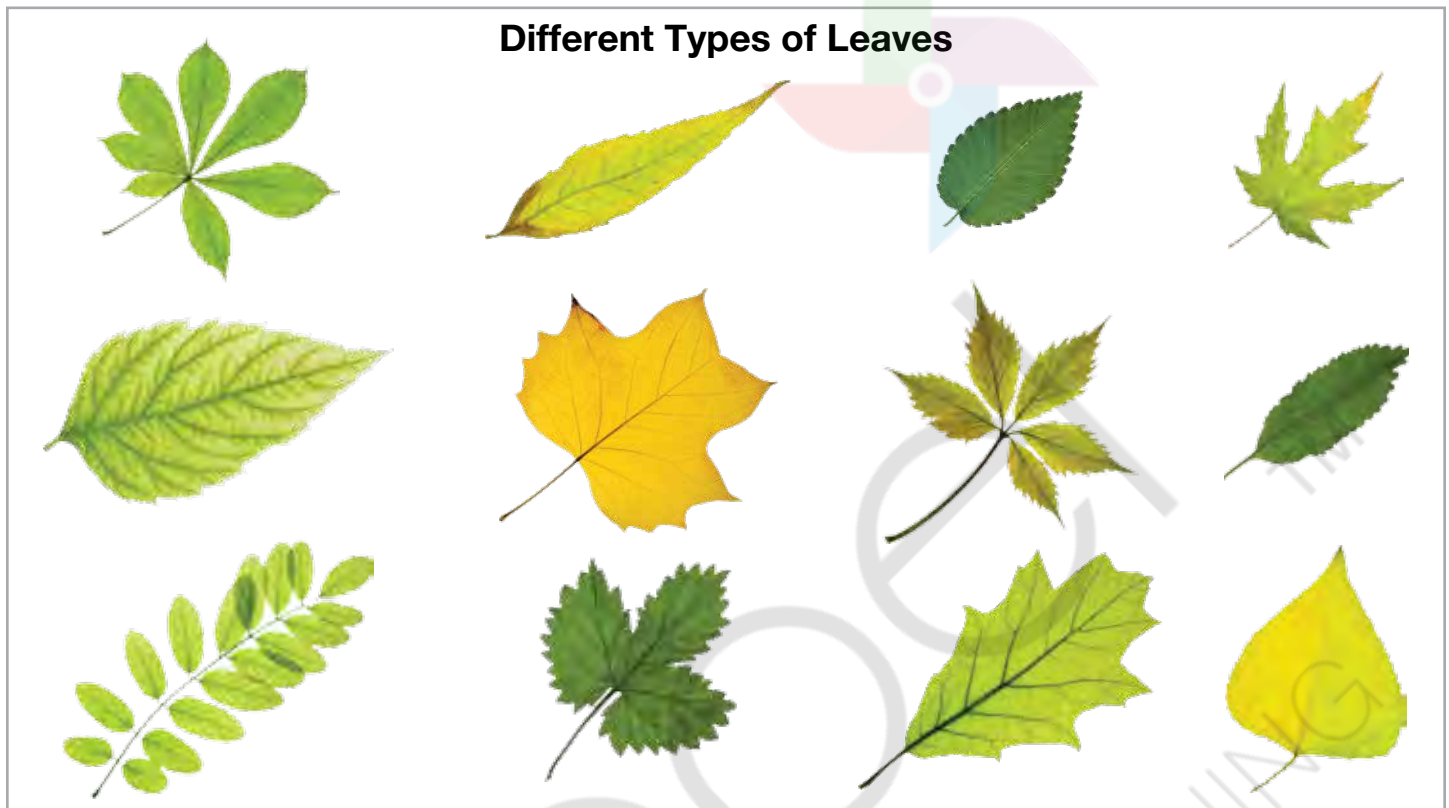
A leaf shows a network of dark lines called veins. Veins are used to transport food and water through the leaf as well as to support it. These small veins or secondary veins emerge from the main vein called the primary vein or midrib of the leaf. The pattern of veins on a leaf is known as leaf venation. Venation plays an important role in identification of the plant to which a particular leaf belongs.

Primary vein



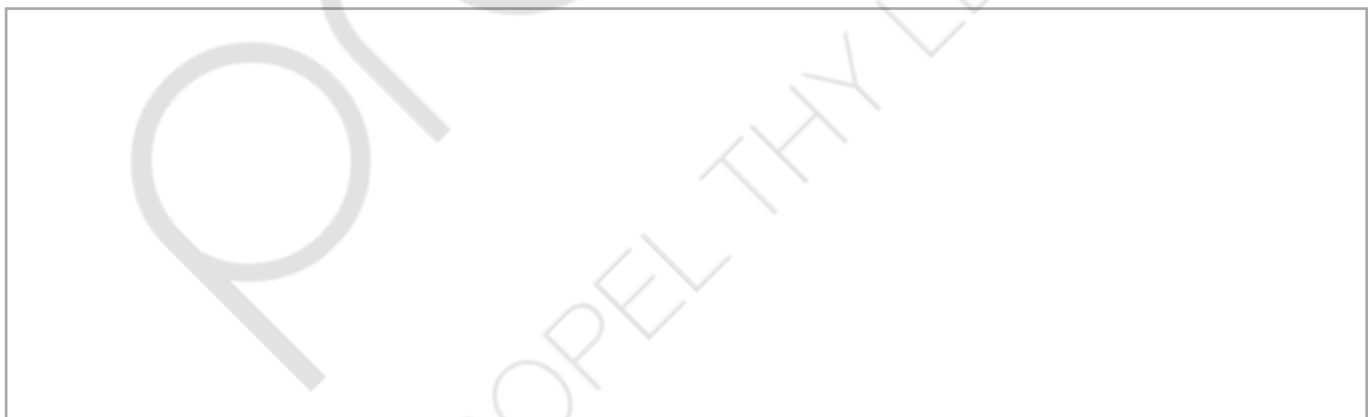
Secondary vein

Leaves are an important part of the plant. They make food in the presence of sunlight. This process is called photosynthesis. Typically, leaves are thin, flattened parts, which grow on the stem above the ground. Leaves of different plants have different colours, shapes and sizes.



I OBSERVE

1. Trace any two leaves in the given space and label their veins.



2. Collect 5-10 different kinds of leaves from the plants around your house. Put them between newspaper sheets. When they are dried and straightened, stick them in your notebook. Remember to write the names of the plants the leaves belong to. Under each leaf, write one or two unique things you see in it; for example, the type of edge, shape or colour combination.



I CONNECT

Which part of the plant is inside the soil?



I OBSERVE

Find a small plant, preferably a weed with flowers on it, around your house or in your garden. Observe it carefully. Make its rough sketch in your notebook. Pour some water on its root and wait for a couple of minutes till the water disappears in the soil. Now, slowly pull the plant out, making sure its roots are not broken. Use a trowel, if you can find one, to dig the plant out. Take help from an adult, if needed. Wash the roots in water gently so that its roots or branches are intact.

Leave the plant on a newspaper for sometime and let the water dry. Then put it safely between newspaper sheets and bring it to the class.



I ACT

In the classroom, spread out your plant on white paper and observe it. Make its sketch in the given box.

PROPEL THY LEARNING

Roots

Use a magnifying glass to see the details of the roots of your plant. Always keep the plant and your head still, and move the lens to and fro to focus on the part of the plant you are looking at. Draw the details below.



Picture 1



Picture 2



Root of your plant

1. Which picture does the root of your plant resemble?

2. How are the roots shown in the pictures different from each other?

3. What are the similarities between these two types of roots?

4. What could be the different functions of these two types of roots?

Different plants have different kinds of roots. The main root in a plant is known as primary root. The secondary roots emerge from this primary root as its branches. The roots have hair on them, which are known as root hair. All these structures of roots comprise the Root System.

There are two main types of roots—taproot and fibrous root. The roots shown in Picture 1 are fibrous roots and those in Picture 2 are taproots. Taproot is a primary root with secondary roots emerging from it. They also have root hair on them. For example, gram, china rose, carrot and radish have taproot. However, the fibrous root appears like a cluster of secondary roots from which numerous root hair emerge; for example, maize, grass and wheat.

Flower

Let us observe a flower of a plant and find out what all it contains.

Activity

What you need:

A flower and a magnifying glass

Be sensitive to the flower. Pick a flower that has fallen on the ground.

What you do:

1. Draw the flower you have.



2. Describe the different features of the flower.

3. To observe the structure of the flower, remove its petals. What do you observe? Draw it here. Also, draw the structures you see at the base from where the petals grow.

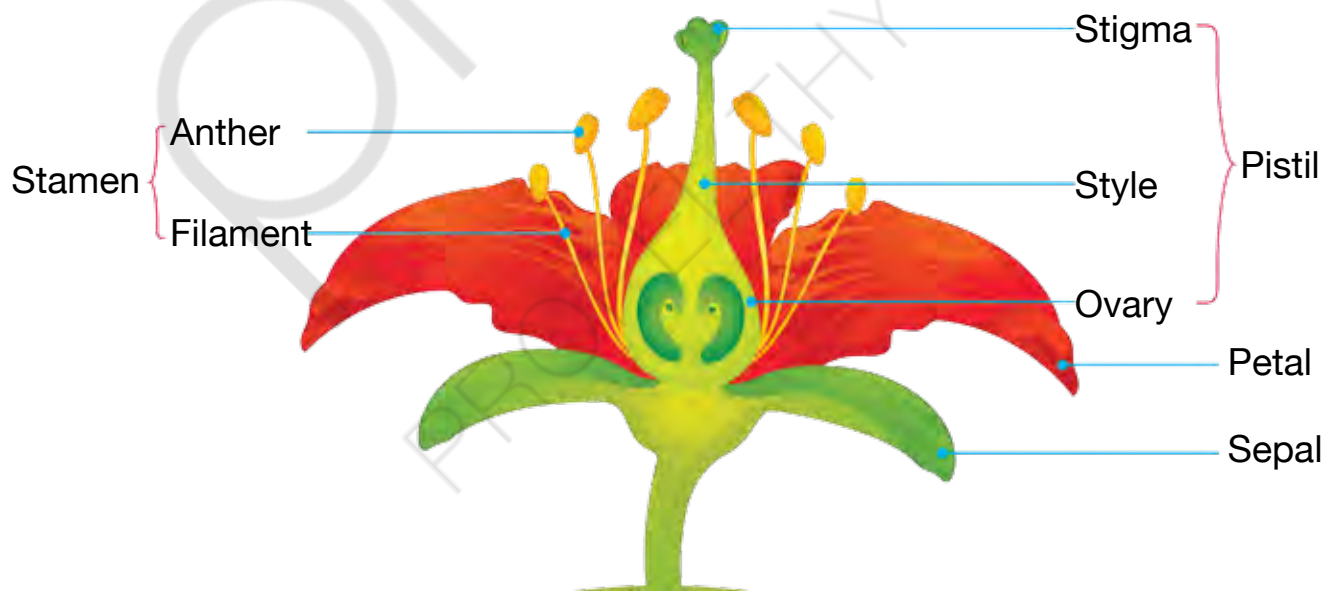


4. A flower has the following parts:

- **Petals:** Bright coloured large wing-like structures
- **Sepals:** Leaf-like green structures, below the petals
- **Stamen:** Small stick-like stand (filament) with swollen heads (anther)
- **Pistil:** At the core, a pitcher-like base (ovary) with a long neck (style), swollen on top (stigma)

Sepals protect the inner part of the flowers when they are still developing.

Petals attract insects. Both stamen and pistil help in producing seeds that later germinate into new plants.



Inside of a hibiscus flower



PRACTICE AT HOME

Paste flowers of two different plants in your notebook. Label their different parts.



MISCONCEPTION ALERT

'It's just a plant!'

Some pupils treat plants and plant materials as if they have no life and are of little value. It is important for us to know that plants are wonderful, a miracle of nature and extremely valuable to all of us. They are as much a part of this world, as we are. Without them, it will be a boring planet. Without them, we would not be able to survive. They give us the fresh air that we breathe; they give us the food that we live on.



FUN TO KNOW

Many trees can live for hundreds of years. An oak tree, for example, can live for more than 200 years. It supports thousands of insects that live on and under it. Its roots go very deep down in the ground as they need to absorb approximately 190 litres of water every day. In the year 2004, the United States of America officially declared the oak as the national tree because it is a symbol of the nation's strength. The oak tree is also the national tree of many other countries including the United Kingdom, France, Germany, Poland and Serbia. The Angel Oak, which is also called 'The Millenium Tree', is situated in Angel Oak Park, South Carolina. It is 65 feet tall, 9 feet wide, and has a crown spread across 17,000 square feet. Its longest branch is 89 feet in length. Estimated to be around 1,500 years or more old, it is acknowledged as the South Carolina Heritage Tree.



Fruits



I TALK

1. What is your favourite fruit?
2. How do you know it is a fruit?

When you think about fruits, you probably think about something sweet and juicy to eat, i.e., apples, mangoes and oranges. But have you ever thought that tomatoes or cucumbers could also be fruits!

In flowering plants, a fruit is the part that develops from the flower. The fruit contains seeds of the plant. It covers and protects the seed. Most fruits are fleshy and juicy (like mangoes and oranges). However, some are not juicy (like almonds or walnuts).



FUN TO KNOW



A fruit is usually soft and juicy, but not always. Sometimes it's covered by a hard, protective shell. Think about a watermelon, for instance. It is soft and juicy inside, but from the outside, it is hard. Walnuts and other nuts are actually fruits, even though they are hard.



I ACT

Look at the following food items. Tick (✓) if they are fruits and cross (x) if they are not.

| Name of food item | Fruit |
|-------------------|-------|
| Watermelon | |
| Pumpkin | |
| Apple | |
| Pear | |
| Strawberry | |
| Cashew nut | |
| Coconut | |
| Beans | |

| Name of food item | Fruit |
|-------------------|-------|
| Green chilli | |
| Carrot | |
| Onion | |
| Banana | |
| Cucumber | |
| Papaya | |
| Garlic | |
| Potato | |



I REFLECT

Answer the following questions in your notebook.

1. What makes something a fruit?
2. What are the different fruits we eat but call them vegetables?



FUN TO KNOW

Strawberries are the only fruits which grow seeds on their outer covering. On an average, one strawberry fruit has around 200 seeds.



I READ

To answer the question ‘IS IT A FRUIT OR A VEGETABLE?’, you need to ask, ‘DOES IT HAVE SEEDS?’

If the answer is yes then, technically, it is a FRUIT. For example, apples, oranges and watermelons are fruits because they have seeds which grow into new plants some day.

The little black dots on strawberries are also seeds which make strawberry a fruit.

Things like radishes, celery, carrots and lettuce do not have seeds; so, they are called vegetables. Vegetables are any part of the plant that doesn't have seeds.

If you pay attention, you will realise that a tomato contains seeds in it; therefore, it is a fruit. Cucumbers, green beans and walnuts also have seeds, hence they are also fruits.

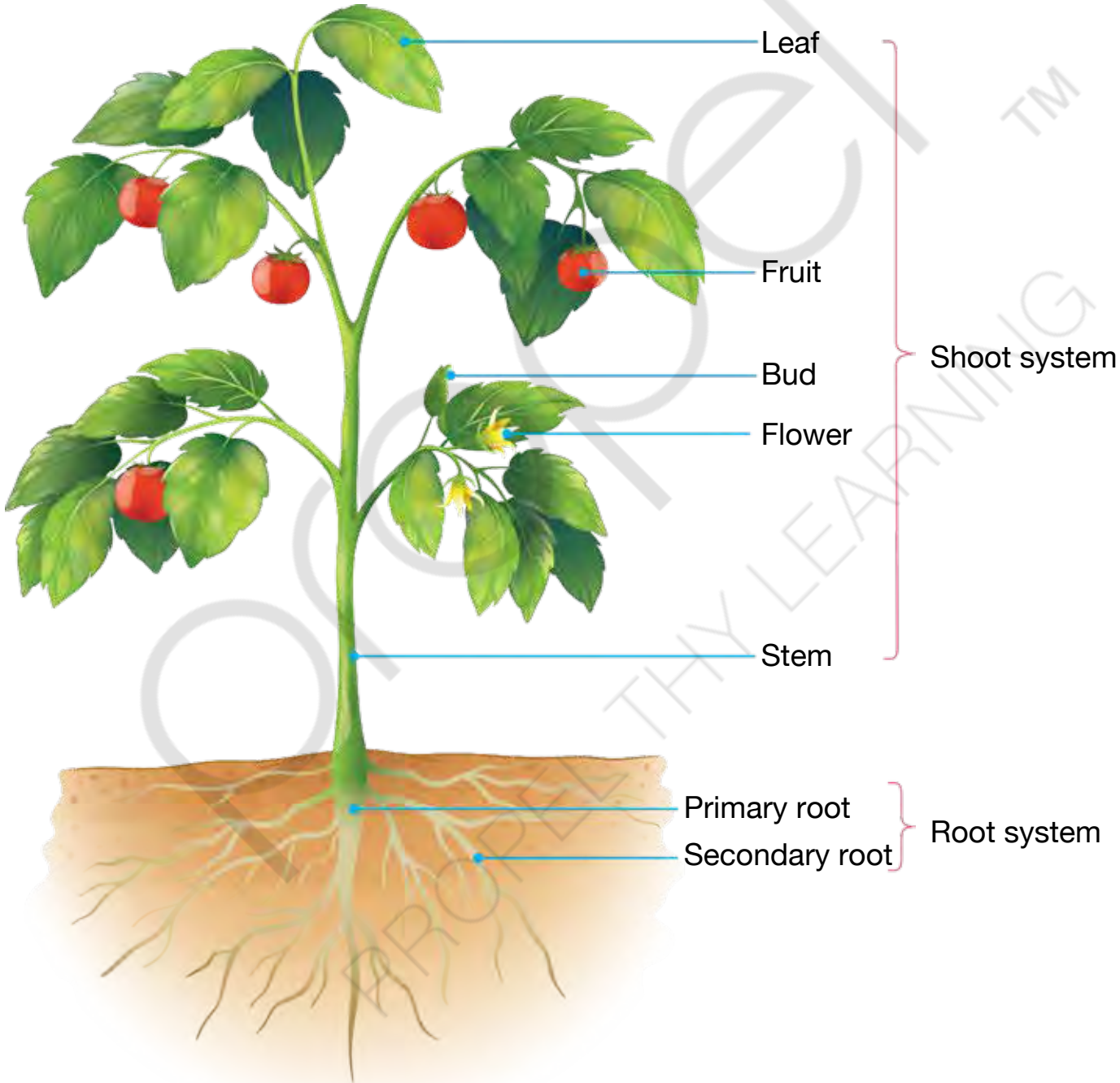
Which parts of the plant do we usually eat—the seed, the stem or the leaf? When we eat asparagus, we eat the stem of the plant. When we eat spinach or lettuce, we eat the leaves. When we eat corn or peas or cashew nut, we eat seeds, and when we eat radish or carrot, we eat roots. Cauliflower and broccoli plants produce flowers that we eat.

In the case of a few plants, we eat more than one part of the plant. For example, the root of the beet plant is what most people like to eat, but its leaves are also good to eat in salads. We eat the root of the onion plant, but we can also eat its stem for a special flavour.

Fruits are not always fleshy or juicy; sometimes, they have a very hard covering that protects the seed from external dangers, like a coconut.

Observe the picture given below. The plant has the following two main parts:

- One is generally brownish in colour and grows below the ground. It is the root of the plant. Because it has a fairly elaborate structure including primary and secondary roots, it is also called the 'root system'.
- The other is generally green in colour and grows above the ground. It consists of trunk or stem, branches, leaves, flowers, buds and fruits, and is called 'shoot' or the 'shoot system'.



Parts of a plant



1. Create a plant using a variety of materials listed in the following table. Select materials from the table as per your choice and construct a plant. You can also add any other material that you want to use. Label each part after you have made your plant.

| Parts of a plant | Possible materials |
|------------------|--|
| Stem | hollow pipe, card tubing, drinking straw, etc. |
| Roots | String, wool and cotton |
| Leaves | Card and paper |
| Flowers | Art paper, cake cases, milk bottle tops and paper plates |



2. Choose another plant which is found in your locality. Conduct a research and make a booklet based on it.

Focus on the following points:

- a. Type of roots
- b. Structure of the stem (whether it has nodes or internodes)
- c. Leaves and venation
- d. Flowers and their structure



Through these activities, children get to know about details of plants like the structures of roots, stems, leaves, flowers and fruits. They learn about each part by observing it and performing various activities. You can provide such opportunities to your child which challenge his/her thinking.

Where is My Home?



I TALK

Look at the picture on page 5.

1. What do you think these children are talking about?
2. Whom do you agree with? Explain.
3. Whom do you disagree with? Explain.



I READ



Yogita



Mohika

Yogita and Mohika had gone for a picnic to Garh Mukteshwar. They were playing on the riverbank. Suddenly, Mohika spotted something on a side—a coconut with a few leaves coming out of it! She had never seen a coconut growing in this area, so she was surprised to see it in River Ganga. Yogita was also curious to know where that plant grew.



I TALK

1. How do you think the coconut came there?
2. What would you have done with the coconut, if you had found it?

Both the kids wanted to take the coconut and plant it in the backyard of their house in Delhi. Yogita was excited that soon she would get tender coconuts to drink coconut water from. Mohika was already dreaming about making coconut burfi.

They told their plans to their uncle.

He thought for a while and said, 'This is a coconut plant. Its natural habitat is a coastal area or an area with regular rainfall, lots of sunlight and no cold.'

Mohika asked, 'What do you mean by habitat?'

Can you guess what the habitat of a plant would be?

He said, 'Habitat is the environment in which a specific plant or animal naturally exists. For example, the natural environment of a coconut tree is an area with abundant sunlight, humidity, regular rainfall and brackish (saline) soil. If you plant it in Delhi, it may not be able to survive the extreme heat and dry conditions of the summer or extreme cold of the winter.'

This information got Yogita and Mohika thinking about their coconut plant. They felt it was their responsibility to take the coconut sapling to its right habitat so that it could grow there. So, they started a mission to find the right habitat for their little plant.

Where do you think it should be planted?

I REFLECT

1. Why do you think it is important for a plant to be placed in the right environment? Discuss in pairs and write down what both of you agree on.

2. Think of one example of a plant that you know grows only in a specific habitat. Write down the unique features of that habitat.

Plants are found in many different habitats. To be able to survive in their respective habitats, plants need to grow, reproduce and complete their life cycles. They cannot move from place to place like animals. That is why it is important that they are grown in the right environments. For example, a cactus would not grow very well at a place with snow.

The habitats of different plants can be very different from each other. The conditions in the habitat may, for example, be wet or dry, light or dark, trampled, grazed or undisturbed. Although it may be possible to pick out one or two factors that are particularly important, you should understand that it is a combination of factors that determines whether or not a particular plant can survive in a particular habitat.



I READ

Let us read about Yogita and Mohika to know about their journey to different places.

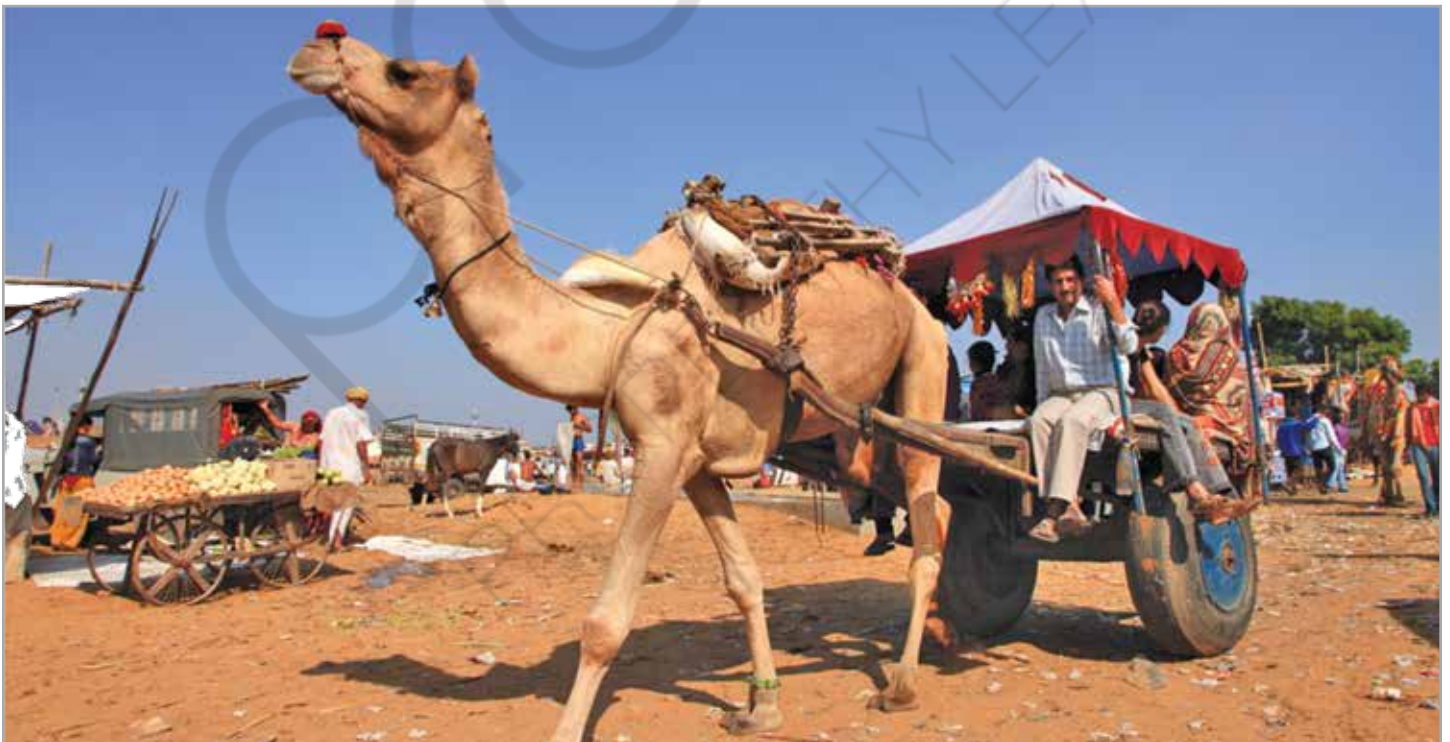
Where do you think they can keep the coconut sapling so that it survives till they find the right habitat for it?

Yogita was excited about going to Rajasthan where her grandparents lived.

Yogita and her parents left early in the morning. She bought a rose plant from a nursery as a gift for her grandfather who was fond of gardening. During the journey, she kept asking her mother about the place where they lived, what they did there, etc.

When they came out from the railway station, they took a camel cart to reach their village, which was about 7 km from the station.

Yogita asked her mother, 'Don't these people have motor vehicles to travel?'



‘They might have vehicles but they cannot be used on sand. They use camel carts to travel, as camels can walk easily on sand,’ her mother replied.

During her journey, Yogita noticed that the roads were not well developed. Concrete roads were almost absent, yet the camel was walking easily on both the muddy and the sandy paths.

She was fascinated by the place and the vegetation there. They looked very different from her surroundings in Delhi. She took some pictures and inquired about the names of different plants.



Khejri Tree



Desert Shrub

What kind of vegetation do you observe in the pictures taken by Yogita?

‘We see so many trees on both sides of the roads in Delhi. Why do we have few trees here?’ asked Yogita.

‘Yogita, hold your questions. You will get the answers once we reach home,’ replied her mother.

What according to you would be the answer to Yogita’s question?

Yogita was fascinated by the camels and watched them carefully. She enjoyed the ride to the village. Yogita ran inside the house and hugged her grandmother. She kept looking for her grandfather to give him the rose plant. He was in the backyard.

‘Grandfather! I am here. Look at what I have brought for you,’ said Yogita as she gave it to him.

Grandfather hugged Yogita and kissed her forehead. He looked at the rose plant and replied, 'How sweet of you, my darling! Thank you very much.'

'Grandfather, let us plant the rose in the soil in the backyard,' said Yogita.

'Oh no dear! We cannot plant roses in this sand. This is a desert area. The sand here is not fit for growing rose plants,' said the grandfather.

Why did grandfather say that sand was not fit for the growth of the rose plant?

'But Grandfather, on my way, I saw some plants, which had grown on the sand. Why can't the rose plant grow here?' said Yogita.

'Yogita, not every plant can grow in the desert, because it is a very dry place. It does not receive as much rainfall as Delhi. Only those plants can grow here which need little water. There are some specific plants, which can grow in sand. Let me show you an album from which you will get to know about the plants that grow in the desert,' said the grandfather.

Khejri

Khejri tree is medium in size. It is found mainly in the Thar Desert of Rajasthan. Since all parts of the tree are useful, it is called the 'King of the Desert' and the 'Wonder Tree'. It is worshipped by a large number of people. It is drought resistant and can survive in the minimum rainfall. Its leaves are the favourite food of cattle. The tree also provides shelter to the animals, birds and humans.



Kikar

Kikar trees grow wild. They are also cultivated for their timber and fuel. All the parts of the Kikar or Babool tree are used in making various medicines. The bark is mainly used to cure cough, diarrhoea and dysentery. The branch of the Babool or Kikar tree is used as a toothbrush that strengthens the gums and whitens the teeth.



Cactus grows easily in desert areas where the conditions are extremely dry. Let us observe the plant carefully in the class and understand its structure.



- 1. Describe the plant.

- 2. How is it similar to the plants we commonly see in our environment? How is it different from them?

- 3. Touch the stem and press it gently. Be careful of the thorns. How does it feel?

- 4. How would it feel to press the stem of a plant like rose?

- 5. Why do you think this is so?

6. Cut the stem of the cactus plant. What do you observe?

 I TALK



Do you think the desert is the right habitat for our young coconut sapling? Give reasons for your answer.

The cactus is a plant that can grow in extremely dry conditions. It has needle-like leaves and a very thick stem. The food and water needed by the plant are stored in its thick stem. Instead of leaves, most cacti have spines or scales which are modified leaves. These spines prevent the loss of water from the plant on hot days.



MISCONCEPTION ALERT

Aloe Vera is a cactus.

Many people consider cactus and aloe vera as the same type of plants because of some similarities in their features. Yes, both of them store high amount of water in their spines and leaves so that they can survive during the shortage of water. They both develop prickles so that animals don't eat them for water! However, aloe vera grows quickly, taking just eight months to mature, while cactus takes many years. Aloe vera is native to North Africa, while cactus is native to the American continents. Aloe vera is darker and has long, flat leaves, while cactus is usually light coloured with fleshy and swollen stems.



PRACTICE AT HOME

1. Find out information about two more plants that are commonly found in desert areas. Draw or paste their pictures in your notebook.
2. How are the desert plants different from plants growing in rainy areas? Explain with the help of suitable examples. Use pictures to show their differences.

The Majestic Himalayas



I READ

Mohika went to Kashmir during the last autumn break. She shared her experiences with her friends when she came back. She told them, 'I saw amazing landscapes in Kashmir. I was struck by the stretches of fields covered with purple flowers. The air was filled with sweet, honey-like fragrance. It looked so beautiful and it was different from any other plant I had seen in the city. My mother told me it was the saffron plant, which largely grows in this part of the country. We finally reached the place where we were supposed to stay. It was surrounded by large trees, shaped like Christmas trees. My mother told me that the shape of these trees was conical. They looked extremely beautiful as they stood tall around our hotel.'



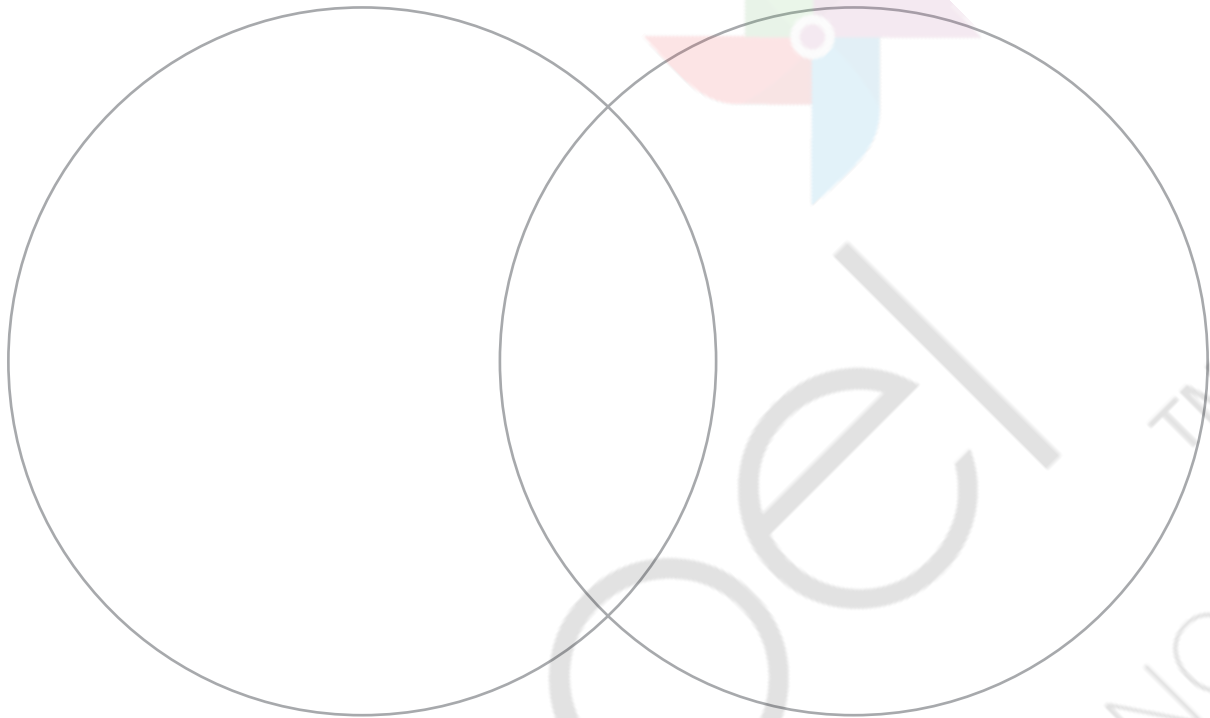
I WRITE

1. Describe a hill station you have visited.

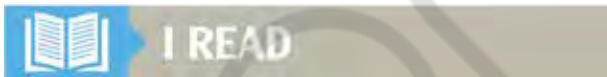
2. What differences and similarities did you notice between the trees you find in the plains and the ones that grow in hilly areas? Write them in the following Venn diagram.

Trees in the Plain Areas

Trees in the Hilly Areas



We see many plants all around us. Different areas have different kinds of plants. These plants have different features depending upon the areas where they grow—for example, a cactus in a desert, a mango tree in plains and a pine in mountains. We have read about cactus in the previous pages. Let us find out the special features of trees that grow on mountains.



Deodar

Standing tall with its horizontal branches, deodar is an evergreen tree.

It is a conifer or cone bearing tree. The deodar tree is considered sacred in the hills. Its name takes its origin from two separate words, Deo (Devta or God) and Daru (Tree), and is considered the tree of gods. It gives the most valuable wood, which is used for the construction of houses and temples. It also has medicinal properties. Deodar oil is in high demand in perfumery and soap industries.



Chir or 'Pine'

The long-needle pine is the native of the Himalayan region. It is a tall, evergreen tree. It has needle-shaped leaves.

Its wood is used as timber for construction of houses and for fuel. Its needles are collected for mulch for cattle sheds and for packing fruits.



Saffron

There are only two or three places in the whole world where saffron grows. Kashmir is one of them. The saffron plant is very small and its flower is the only part that is seen above the ground. This flower blooms in autumn. It has a unique sweet smell and is used for dyeing. It is also used in cooking as a flavouring and colouring agent. It is believed to have many medicinal properties. It is called kesar in Hindi.



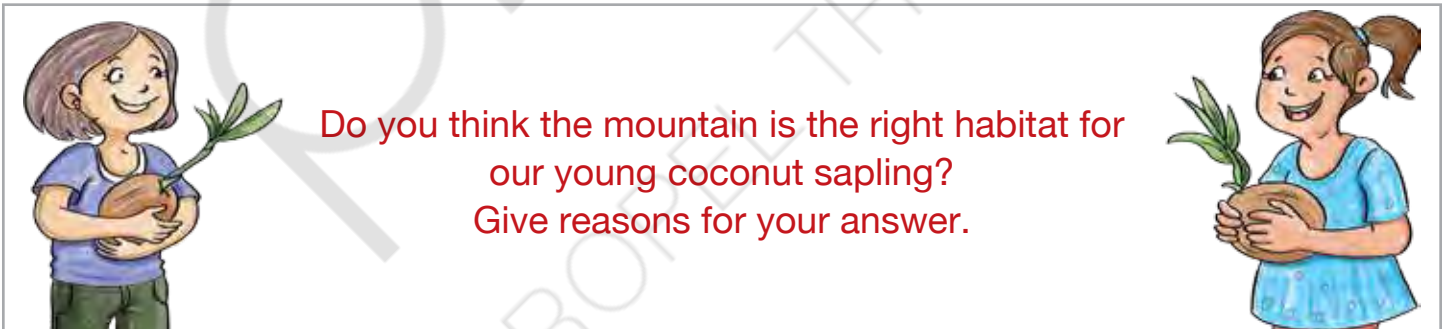
PRACTICE AT HOME

You must have visited some places during your vacations. Paste the pictures of the plants commonly found there and describe their features in your notebook. Share this information with your friends.



I EXPLORE

Select one of your favourite trees from your surroundings. Find out some information about it and write it in your notebook. Collect samples of its flower, leaf and seed and paste them in the notebook, and draw its fruit.



**Do you think the mountain is the right habitat for our young coconut sapling?
Give reasons for your answer.**



Children get to know about different trees found in desert and mountain areas. They learn about their features and uses. You can ask your child to find information about 1 or 2 trees of a specific region and make a booklet.

Knock, Knock! Who Lives There?

I READ

Yogita walked by a pond in their colony. Mohika followed her closely. They were surprised to see some green plants floating on the water. Yogita wondered if someone had thrown them in the water, and they would rot there. Mohika laughed and said, 'No, Yogita! The plants are not thrown in water. They grow in water.' Yogita was confused and asked, 'How can plants grow and live in water?' Let us find the answer to Yogita's question.



I OBSERVE

Observe the following pictures carefully and share your observation with your classmates.



Victoria Cruziana



Water Hyacinth



Water Lily

1. What strikes you about these leaves?

2. What is common between these plants?

3. What do you think helps these plants float on water?

Plants living in water have thin but large leaves. The leaves have air spaces in them that make them lighter in weight, which helps the plant float on water. They have a waxy coating on them that helps remove excess water from the surface. This prevents the plants from getting spoilt in water. These plants have soft stems, which do not break with the flow of water. All these plants are called aquatic plants because they live in water.

They have features that help them survive in water. We also say that they have adapted themselves to live in water.

Different Types of Aquatic Plants

Floating Plants

Floating plants are not attached to the lake's bottom, but they have roots, which absorb water. Floating plants can be found in fresh or salty water. The leaves of these plants are firm and remain flat in order to absorb more sunlight. Common examples of floating plants are the various types of lilies (such as the water lily or banana lily), duckweed and water hyacinth.



Water Hyacinth



Hydrilla

Submerged Plants

Submerged plants are rooted in the lake's floor and most of their bodies are under the water. The leaves of these plants are thin and narrow. Examples of submerged plants are hydrilla and bog moss.

Marginal or Emerged Plants

Emerged plants are rooted to the soil under water but have most of their parts above the water. These plants need constant exposure to sunlight. They are also known as rooted floating plants. Examples of emerged plants are knotweed, cattail and redroot.



Cattail

Do you think water is the right habitat for our young coconut sapling? Give reasons for your answer.



FUN TO KNOW





Want to float on a leaf? Go to Brazil! The queen-size royal waterlily, which grows in Brazil, has leaves over 2 m (about 8 ft.) wide. The leaves can hold weights up to 23 kg. A child could sit on a leaf without sinking, but an adult would be too heavy. The flat top of the leaf would make a comfortable seat for you. The underside of the leaf is covered with sharp spines to keep fish from eating it. Waterlily leaves—usually called lily pads—float on the surface of ponds and lakes. Do you know why? So that they get the air and sunlight they need to make food. Far below, the root of the plant is anchored to the bottom of the lake.





Now, let us do another activity to understand how plants survive in different regions. Look at the following table and the unique features of some plants. Observe carefully and think hard, and then fill up the table.

How are plants suited to their habitats?

| Name of plant and its unique features | How this feature helps the plant to survive |
|---|--|
|  <p>Cactus Thick skin with spines</p> | <p>Prevents water from getting evaporated from the plant so that it can survive in desert.</p> <p>Less likely to be eaten by herbivores, e.g., cattle.</p> |
|  <p>Aloe Vera Fat, fleshy leaves, thorns on the edge</p> | |
|  <p>Grapes It climbs up by twining around branches of other plants.</p> | |
|  <p>Night blooming jasmine (Ratrani) White, scented flowers</p> | |



My Own Plant

1. While you were exploring the various habitats, imagine you came across a totally new plant. This is your discovery.

Make detailed drawings of the new plant, showing features that make it suitable for its particular habitat. Label the various features. Include all the descriptions or explanations you have studied.



2. Using various materials and designs, you can also make a model of your new plant. Remember, you are making a plant with all the parts that you want. Make the model as accurate as possible. Present the model to your class and explain the functions of its different parts.



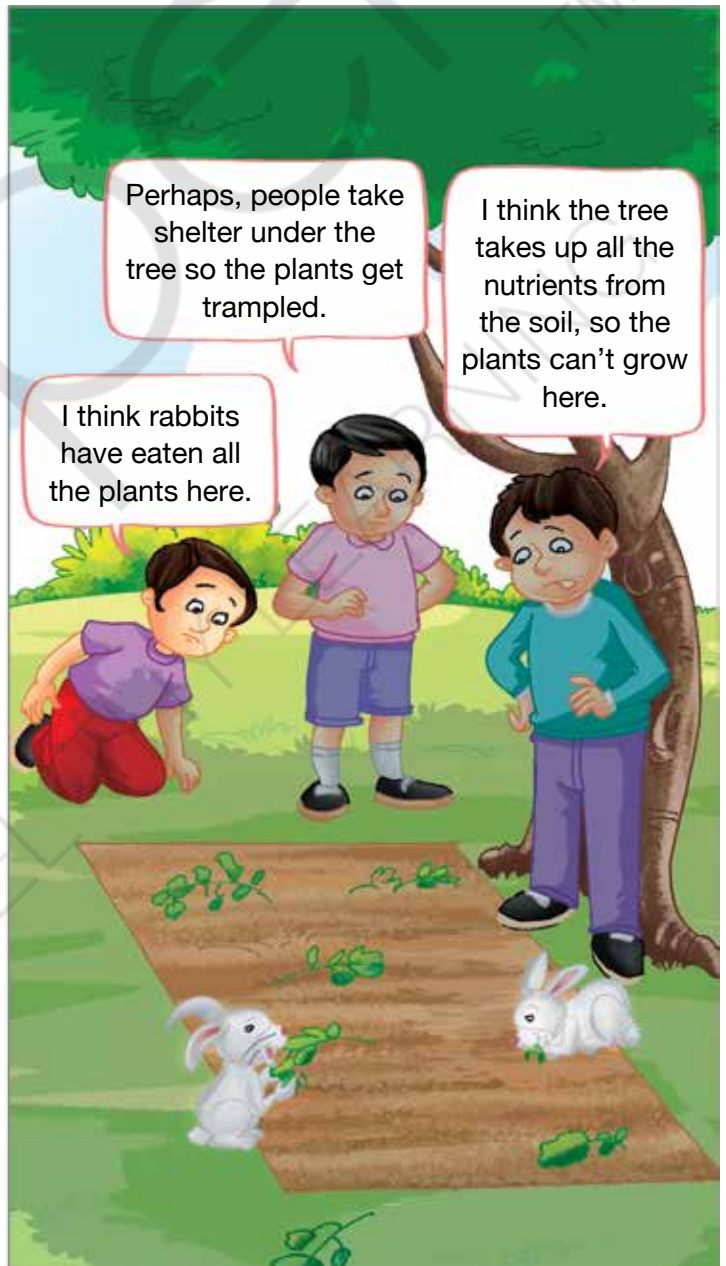
This activity involves illustrating and designing a plant, which the children have 'discovered' in a particular habitat. It encourages them to reflect on what they have learnt about plant adaptations. It requires creative thinking and gives opportunities for developing subject-specific vocabulary and presentation skills.

The journey Yogita and Mohika took has not ended yet. They are still looking for just the right habitat where they could plant their coconut sapling. If you want to help them, do your research and give them suggestions. Write down the reasons supporting your suggestion of a particular habitat in your notebook.



 I TALK

Look at the following picture. What do you think is happening here? Form groups and discuss your observations.





Look at the following two pictures. Each of them depicts a habitat.



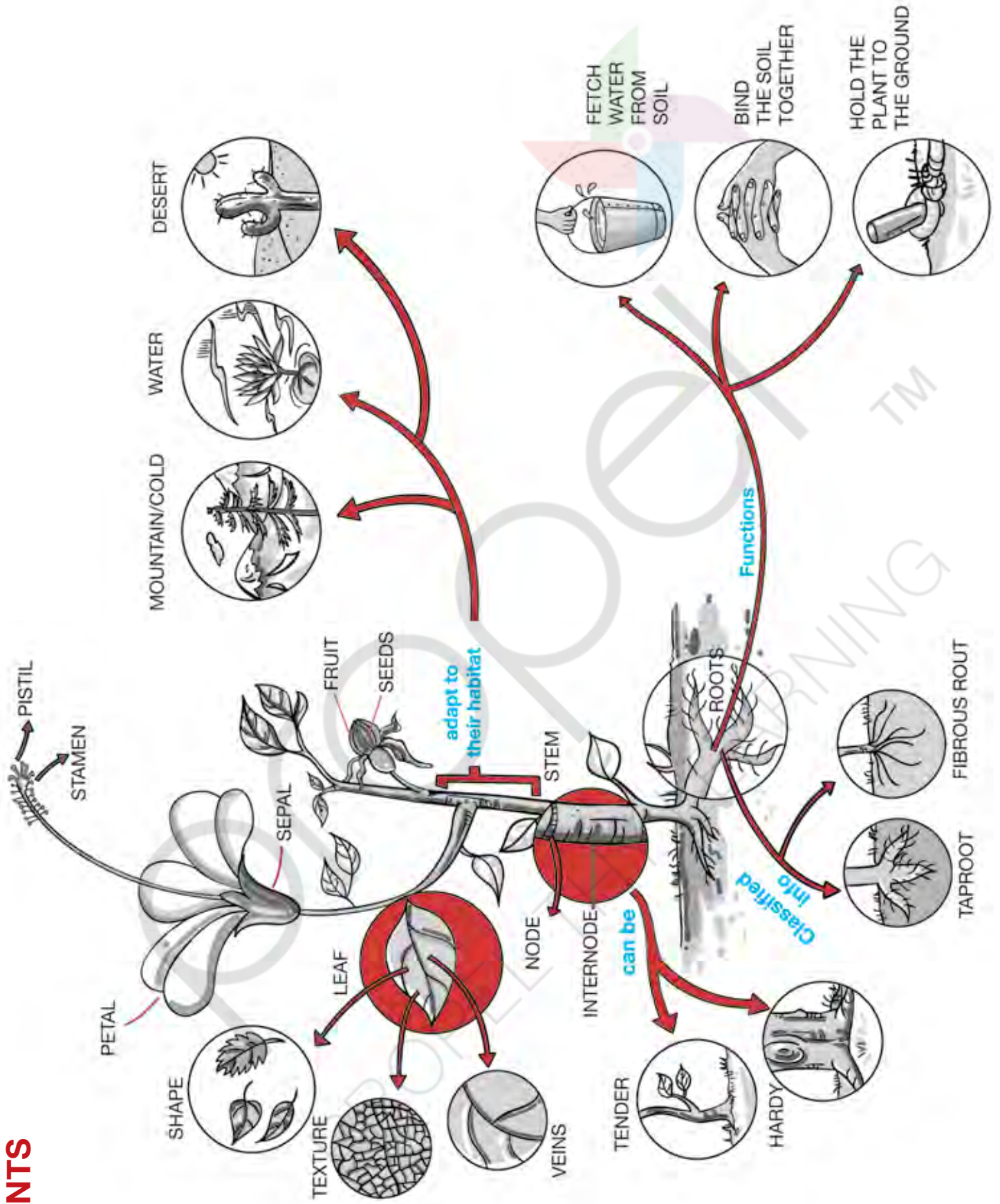
Based on your learning from the theme, compare these two habitats. Keep the following points in your mind. You can also use the learning from the cartoon. Make a chart after your group discussion.

- Any difference in the kinds of plants
- Any difference in the sizes of plants
- Any human effort, i.e., watering, uniform sowing, etc.
- Any difference in the quality and quantity of the soil or the place where they are growing
- Any difference in the amount of water available. Maybe one habitat gets more water than the other.



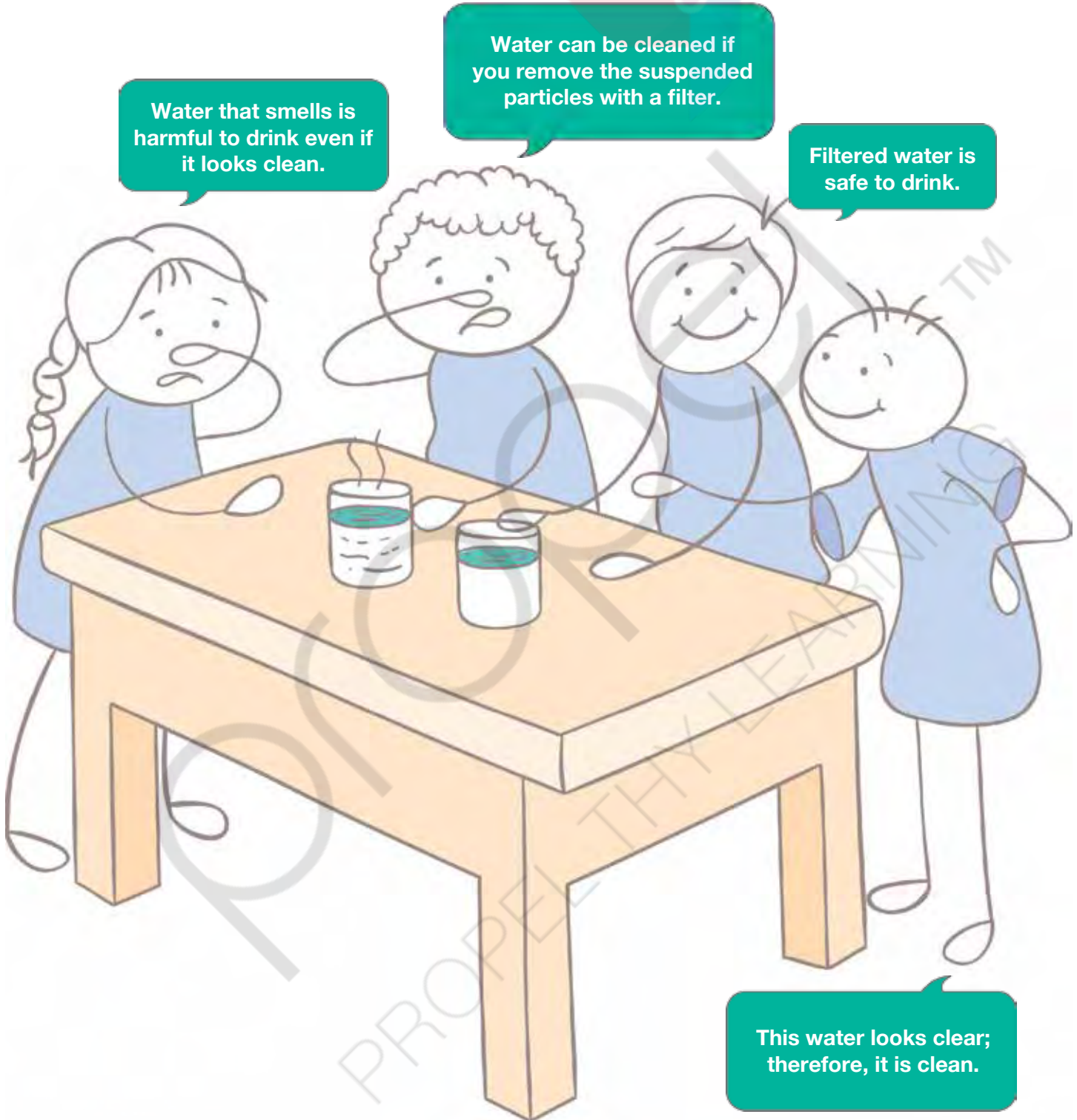
This activity provides an opportunity for children to compare different habitats. They are able to build an idea of how the habitats differ from each other and the effect these differences may have on the plants and animals living there. Give them an opportunity to explore several different pairs of habitats, such as a grassy area out in the open and a grassy area under a tree; a playing field partly trampled and partly not trampled; a grassy area 2 m away from a wall and a grassy area close to a wall.

PLANTS





WATER



What do YOU think?

The Deadly Water



I TALK

1. Have you ever felt uneasy after eating something or drinking water from outside? For example, do you remember feeling sick after eating from roadside stands?
2. What do you think will happen if you drink water from an unhygienic place?
3. Have you heard of any disease that people get after drinking contaminated water?



I READ

Ghooran is a 24-year-old man who lives in a village, Khatiya. He lives in a single room with his family. The family earns their livelihood by growing and selling vegetables. They do not have a toilet and use the open fields instead. They fetch water for drinking from a pond a few hundred metres away from their house. Everybody in the surrounding area uses water from the pond for drinking, washing clothes and bathing. The same water is also used by domestic animals to drink, play in or just cool down in hot summer.

Ghooran spends a lot of his time at his father's vegetable field after he returns from the market. One day, while he was working in the field, he started feeling uneasy and felt like vomiting. He passed watery stools repeatedly. He didn't have his dinner and went to sleep.



He could not sleep peacefully; he kept waking up to go to the loo. His stool was watery and smelly. Next morning, Ghooran went to the nearby health centre. He was feeling very weak and had to be supported by his sister. When they reached the health centre, they saw many patients being treated in the corridor. The doctor examined Ghooran and found that he was very weak. Ghooran's eyes were sunken, his mouth was dry and his blood pressure was low. His was the twelfth case with a similar problem that day.

I REFLECT

1. What are the symptoms of the disease Ghooran has?
2. What do you think is the disease Ghooran is suffering from?
3. Have you ever seen a person with a similar problem around you? What treatment was given to the sick person?

I READ

Ghooran is suffering from a disease called diarrhoea. People with this disease pass out loose or liquid stools, many more times than normal. Sometimes, the stools may contain blood. It is caused by an infection in the stomach. This disease can last for a few days or for several weeks. Severe diarrhoea may be dangerous to life because the body's water flows out through the watery stools. We need water in our body to survive. To avoid getting dehydrated due to loss of water, doctors prescribe oral rehydration solution (ORS). Infants, young children and weak people are more likely to get this disease. The infections that cause diarrhoea can be due to some creatures that are too small to see. They get into the human body

if the person drinks water that is 'contaminated'. Contaminated water means water that contains impurities including bacteria, germs, chemicals, dirt or human or animal faeces. They are harmful to us and pass from one person to another. Contamination is more common in places where there is a shortage of clean water for drinking, cooking and cleaning. Water can get contaminated with animal and human faeces from sewage water and toilets. Passing stools or defecating in the open or close to a water source can cause water contamination.





Look at the following picture.



The people in this picture are more likely to suffer from diarrhoea. What do you see in this picture that might cause it? Write your observations in the given space.

Water: Nurturer or Killer?

Apart from diarrhoea, there are many diseases that are caused by little creatures living in dirty water or rotten food. Each of these diseases has its unique symptoms. For example, cholera patients suffer from watery diarrhoea and vomiting. Severe cholera can lead to dehydration (where the body loses most of its water) and death. It spreads because of poor sanitation and unsafe drinking water. Cholera can infect people if they eat something or drink water that is contaminated by the faeces of an infected person. Raw or under-cooked seafood and vegetables and fruits that have been washed with contaminated water can also spread the infection.



In your group, choose any one common disease. Explore its symptoms, causes and the ways to prevent it. Make a presentation in your class to inform students about this disease. Invite questions from them. Use the given space to plan your presentation.

PROPEL THY LEARNING



Let us read about another water-borne disease. For a long time people found it hard to believe that it was carried by water. It was considered to be a physical disability, rather than a disease.

Can you guess what this disease could be?

Padamshree's Village

Padamshree was born in a village and lived there with her parents. She was an intelligent and strong girl. She loved to play football and played it very well. She was the most loved football team member of her school. Her mother always encouraged her. She hoped to see her daughter win a trophy at the national game. Her father was a farmer. Padamshree helped her father in the field once in a while.

There was a well in the village from where people used to fetch drinking water. There were no toilets in the village. To answer nature's call, people would go to the fields. Many times, Padamshree had asked her father to build a toilet in their house but he had no money to do so.



One day Padamshree felt uneasy and her neck felt stiff. She had a sore throat and felt nauseous. After sometime, she developed a high fever and suffered from severe diarrhoea. Her mother took her to the doctor but the medicine did not help. The doctor then asked for some medical tests to be done in the laboratory at the hospital. On getting the test results, the doctor told Padamshree's parents that one of her legs was paralysed and that she was suffering from polio.

The news changed her life completely. She would never be able to run on her feet again! Padamshree cried a lot. All her dreams were shattered. Her parents too were very sad. Her father lost his support in the fields, her mother lost her hope and her school lost a champion.

After the initial pain and depression, Padamshree took a deep breath and decided she wanted to fight the disease. She consulted the doctor and asked him about the disease and its causes. Here is what the doctor told her about polio.

'Polio is a highly infectious disease caused by a virus (a kind of germ). Most of the times, polio has no symptoms until the virus enters the bloodstream. It is uncommon for the virus to enter the brain or spinal cord. If this does happen, it can cause paralysis. People living in areas with limited access to running water or proper toilets often get the virus through drinking bad water. This water is contaminated by human waste that contains the virus. A person who is infected by the polio virus may experience a sore throat, fatigue, nausea, diarrhoea, fever or vomiting.'



Children under five years of age are more likely to suffer from this disease than any other age group, but the symptoms may appear even after 35 years of age. Polio is not a treatable disease, yet it is almost completely preventable. Vaccination against polio provides the most effective form of prevention. Vaccine is a tiny dose, given by injection or orally, that protects you from a disease. The Government of India started a programme to eradicate polio from India. Under this programme, children under the age of five years are given free polio drops, which prevent them from getting affected by this disease.'

The dread of not being able to get her polio treated got Padamshree very worried about the other children in the village. She went to the panchayat and told them everything the doctor had told her about polio. The panchayat called all the villagers and asked them to build toilets in their houses. They also set up a polio booth in their village for the vaccinations. Gradually, the number of cases of polio in that village reduced to nil. The villagers felt grateful to Padamshree for pursuing what was most important to keep children healthy.



MISCONCEPTION ALERT

“Polio is a non-communicable disease.”

Many people think that polio is a physical disorder and is not transmitted from one person to another. This is not true. Polio is a communicable disease. A communicable disease can be transferred from one person to another. It can get transmitted from one person to another through the intake of food or water contaminated by the faeces of an infected person.



I WRITE

1. What disease did Padamshree get infected with? How did she get it?

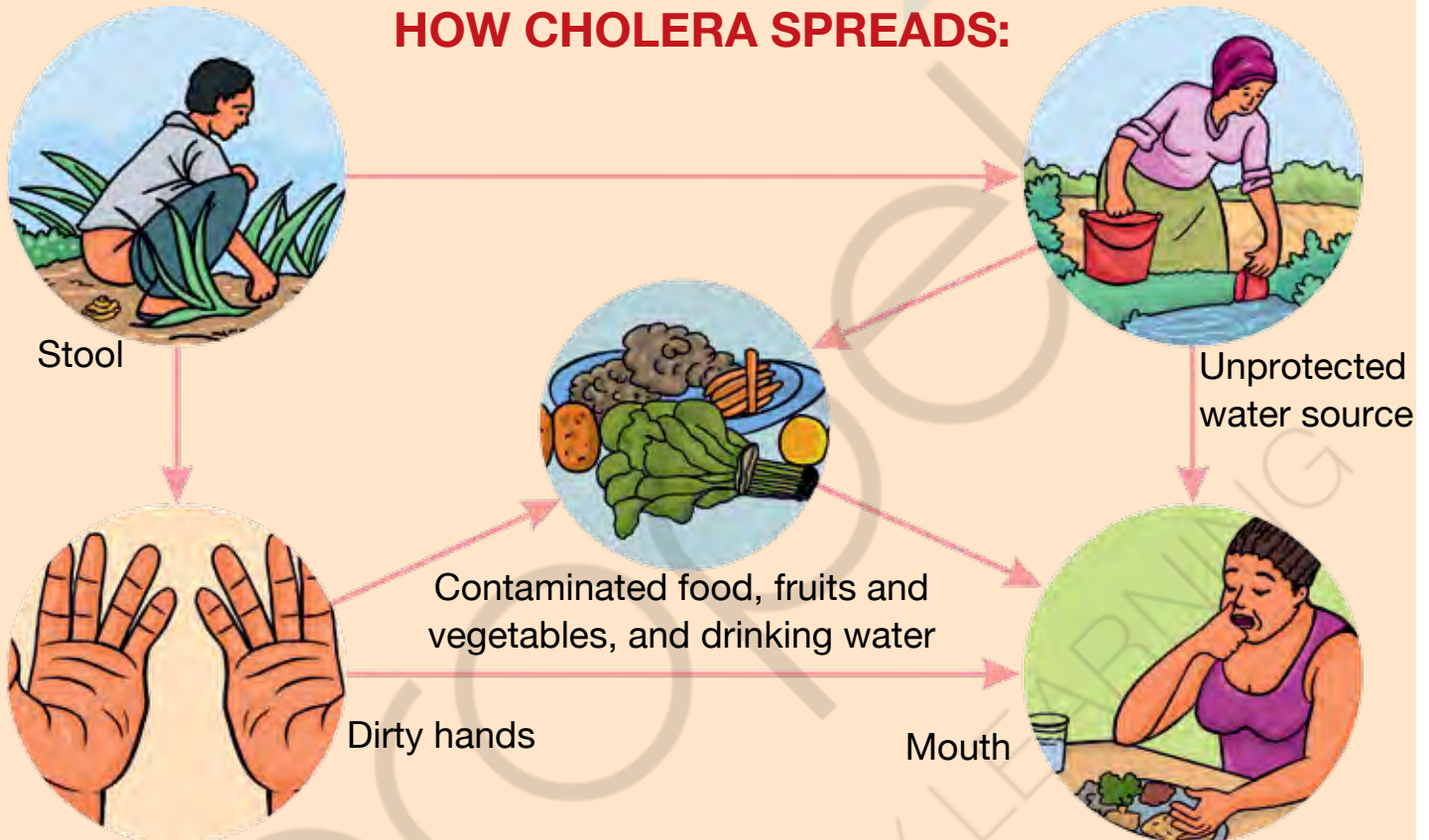
2. What all can we do to prevent polio?

Find out the dates for the next polio camp in your city. Design a poster to build awareness among people about polio before this camp. Here is a sample to help you think.

CHOLERA ALERT!

Cholera is an infection of the small intestine.
It is characterised by severe diarrhoea and vomiting.

HOW CHOLERA SPREADS:



HOW CHOLERA CAN BE PREVENTED:

- Wash your hands thoroughly with soap or ash after taking care of a person suffering from cholera.
- Wash your hands with soap after using the toilet.
- Drink water from safe sources, i.e., tap, borewell, protected well or spring.
- Disinfect water by boiling, or use water purifying tablets or solution.
- Cook food thoroughly and eat it while its hot.
- Store water in clean containers and keep them covered.
- Wash fruits and vegetables under clean running water before you eat them.
- Always use a toilet and keep it clean.
- Dispose of all refuse in a properly constructed refuse pit.

If you suspect cholera in your area, inform health workers at your nearest health facility immediately.

Use this space to organise your ideas.



MISCONCEPTION ALERT

Leprosy can cause body parts to fall off.

Leprosy is a communicable disease but after only two weeks into its treatment, it is no longer communicable. Leprosy does not cause body parts to fall off, although they can become numb. Secondary infections, however, can result in tissue loss and cause fingers and toes to become shortened and deformed as cartilage is absorbed into the body.



By now, children know about the different diseases caused by the use of dirty water. This awareness builds in them the responsibility about keeping and using clean and unpolluted water. Talk about this using your own experiences to help them internalise this understanding.

Water: Unclean, Clean, Cleaner



I CONNECT

How do you think water can be made free from impurities?

When travelling to her village for her summer vacation, Jahnvi brought some samples of water from various places. She asked her father whether it was possible to remove the impurities and make the water drinkable. Her father said, 'Yes, probably, Jahnvi. There are some impurities that can be removed from water by using different methods.'

Jahnvi wondered, 'Can we also remove materials that get dissolved in water? We can't even see them!'

'Yes,' replied her father. 'It is possible to clean the water of visible as well as invisible materials mixed in it. We just have to use different methods for them. Let us try a few and see how they work,' replied her father.



I EXPERIMENT

Aim:

To separate impurities from water

What we need:

Water, beakers, chalk powder, pencil shavings, glass rod, filter paper and clamp stand

What we do:

1. Put chalk powder and water in one beaker. Put pencil shavings and water in another beaker.

Stir the contents of both beakers with a glass rod. What do you observe?

2. Keep the beaker at one place. Don't shake or move it.

What do you observe now?



Why do you think this happened?

Since pencil shavings are lighter than water, they float on it. They can simply be picked up and removed from water. The chalk powder, being heavier, settles at the bottom of the beaker. This process of settling down of substances at the bottom of the container is known as **sedimentation**. This happens only when water/liquid is not disturbed.

How will you separate the chalk powder from the water?

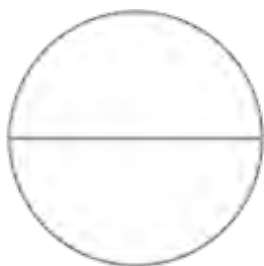
3. Transfer the water from the first beaker to the other without disturbing the chalk powder that is settled at the base. When almost all the water is shifted to the other beaker, the powder will be left at the bottom. This method of separating water from a sediment (solid substance) and pouring it into another vessel is known as decantation.



Is the water in the second beaker clear?

Do you think all the impurities have been removed?

4. Take a filter paper from the science laboratory. Fold it into half, and then fold into half once more.



5. Unfold the filter paper into a cone and place it in the funnel in such a way that it fits well.
6. Rinse the funnel with a little water so that the filter paper is wet. This will make the filter paper stick to the walls of the funnel.
7. Pour the water collected after decantation slowly in the funnel.

Observe the water collected in the beaker after this process.





I REFLECT

1. What do you observe?

2. What is left in the filter paper kept in the funnel?

The process of separating suspended particles from a liquid using a filter is known as filtration. The liquid passes through the filter and gets separated from its impurities. The liquid that is obtained after filtration is known as filtrate and the solid substance left in the filter is known as residue.



Dad, why do we use an electric filter at home when we can remove impurities using these methods?

Water often contains impurities that are invisible to our eyes and they cannot be filtered using these methods. These can be removed only by using better filters.



How do people who do not have electric filters at home separate these impurities? How did people in the past purify water when there was no electric filter? What are the different kinds of filters we have today?

It is not necessary to have an electric filter to separate impurities from water. Let us read about the methods and tools, which were adopted by people decades ago and are still used in some villages, along with the latest filters.

Some deadly diseases spread through contaminated water. Carbon absorbs many impurities present in water, making it much safer to drink. The carbon filter is fitted inside an earthen container. Filtered water is poured out of the tap at the bottom. This large filter is 425 mm tall and was used in homes and workplaces to provide fresh water.



Even today, some people use the clay pot technique to purify water. This is a household unit for filtering, treating and storing potable water. It consists of a clay 'pot' kept in a 20 L plastic container with a tap located close to the bottom. The plastic lid is removed and the clay pot is filled with the water that we want to filter. Water passes slowly through the pores in the sides and bottom of the clay pot and is collected in the plastic container.

This is a steel water filter; the filter is placed in the vessel on top and the filtered water collects in the vessel below, which has a tap for water outlet. When maintained properly, it may serve for two years or more. It can purify water of high bacterial content from wells and ponds. Some of its advantages are that it is low cost, has a long life and is easy to maintain.



Some of the modern-day water purifiers also use the filtration method. This one is called RO (Reverse Osmosis) process and is considered the safest water filter so far. It works on electricity. This machine uses electricity and removes dissolved solids from water. RO treated water tastes sweeter than regular water.

I EXPLORE

1. What other things can be used as a filter? What would they separate?
2. Do you know that our nose performs a function similar to a filter? Find out how.

I PRACTICE AT HOME

Your mother uses a strainer to separate tea leaves from tea and pours it into a cup. She has misplaced the strainer. How would she manage now? Suggest a method to her.

I READ

Substances like salt and sugar dissolve in water completely. Those substances that dissolve in water are known as soluble substances. Substances like sand do not dissolve in water. Solid substances that do not dissolve in a liquid are known as insoluble substances. Whether a substance is soluble or insoluble can be tested only when it is mixed in a liquid.

This property of any substance that makes it soluble is known as its solubility.

When these substances are not removed, they are considered as impurities in water. Thus, we can have two types of impurities in water, i.e., soluble and insoluble.



Sugar/Salt



Sand

I WRITE

1. Give two examples of substances which are soluble in water.

2. Give two examples of substances which are insoluble in water.

Anything that is dissolved in a liquid is called solute. The liquid in which a solute is dissolved is known as solvent. The resultant mixture that we get after dissolving a solute into a solvent is known as a solution.



I CONNECT

1. What will happen to things like leaves or polythene bags if they are thrown in water?
2. What impact will these have on the water?



I EXPERIMENT

Which things dissolve in water?

What you need:

Plastic cups/glasses, spoons, materials like jaggery, curd, coffee, flour, stone pebbles, glass marble, milk powder, rice, dal, powder paint, chalk powder and talcum powder

What you do:

Write the names of each material you have collected in the first column of the table below. Predict whether it will dissolve in water. Write 'will dissolve' or 'won't dissolve' in the second column. Put the material in the water in the glass and stir with a spoon. Observe it carefully. If the water is clear, the material has dissolved. If the water is not clear (you cannot see through it), the material has not dissolved. Write it in the third column.

| Material | My prediction | Tested outcome |
|----------|---------------|------------------------|
| Sugar | Will dissolve | Dissolved, water clear |
| | | |
| | | |
| | | |
| | | |
| | | |

When something has dissolved in water, you cannot see its particles separately. Undissolved solids, like talcum powder, form a suspension, making the water look cloudy. If you leave it still, the talcum powder 'settles down' at the bottom of the glass.



What you need:

Mustard oil, water, fruit juice, beakers and glass rods

What you do:

1. Pour some water in a beaker. Add oil, pouring it down the inside of the beaker into the water.

Use a glass rod to mix them. What happens to the oil?

2. Pour water in another beaker. Add fruit juice. Use a glass rod to mix them.

What do you observe? Why do you think it happens?

Some liquids like oil or ghee do not dissolve in water but float on its surface. These are known as immiscible substances. Observe closely and you will see that two distinct layers of the liquids are formed. These solutions where the substances do not dissolve and remain separate are known as heterogeneous solutions.

Liquids like fruit juice that dissolve in water (another liquid) are known as miscible substances. In such cases, the solution appears as one liquid, also called a homogeneous solution.



Fruit Juice



Oil



Through the above discussion and the tasks that followed them, children learn about multiple impurities that exist in water and some simple ways of getting clean water. It is extremely important that they learn about the value of clean unpolluted water. They also need to know that packaged water is not the only source of clean water. The filtered water at home is more reliable.



PRACTICE AT HOME

Repeat the previous procedure by mixing the following materials in water. Based on your observations, identify the miscible and immiscible materials. Use the following table for this task.

| Substance | Miscible | Immiscible |
|--------------|----------|------------|
| Food colour | | |
| Milk | | |
| Coconut oil | | |
| Kerosene oil | | |
| Apple juice | | |
| Buttermilk | | |

Observe different activities related to water at home. Give two examples of miscible and immiscible substances.



FUN TO KNOW

Some impurities of drinking water, which are soluble and invisible to eyes, can be harmful. These impurities can be made inactive by adding chlorine tablets in appropriate amounts. Chlorine tablets are available at municipal health departments and government hospitals. You can also partly purify water at home by boiling it.



Nemo: The Fish



I ACT



Once, there was a little fish called Nemo. He was happy because he lived in a clean river. He loved to play and swim in the water. Nemo had lived in this stretch of the river all his life.

Now, he is going on an adventure trip down the river.

Do you want to know what Nemo would experience and how he would feel about his journey?

What you need:

- A two-litre glass jar
- Sponge cut in the shape of a fish (Nemo)
- A small rubber ball tied to Nemo, attached with a small stick to hold
- Small amounts of the following: Engine oil, small circular pieces of paper, soapy water, red and green food colouring

What you do:

Put Nemo inside the glass jar which is full of clear water.

Nemo swims beside a large parking lot. Some cars parked on it are leaking engine oil. The rain is washing the oil into the river below. (Pour engine oil into Nemo's jar.)

How is Nemo?

Nemo swims past ghats. Some people throw garbage into the river. He also sees many people washing their clothes in the river. (Sprinkle pieces of paper and soapy water into Nemo's jar.)

How is Nemo?

Several factories are located downstream away from the city. Although regulations limit the amount of pollutants the factories are allowed to dump into the river, factory owners sometimes do not abide by them. (Pour some red and green food colouring into Nemo's jar.)

How is Nemo?



I REFLECT


1. What changes did you notice in Nemo?

2. Do you think Nemo will survive in these conditions? Write reasons to support your response.

 I TALK

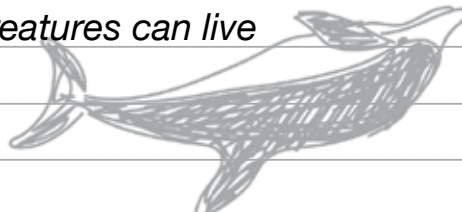
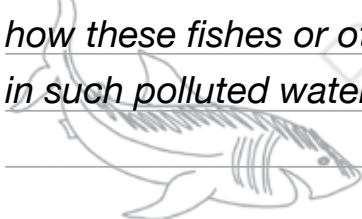
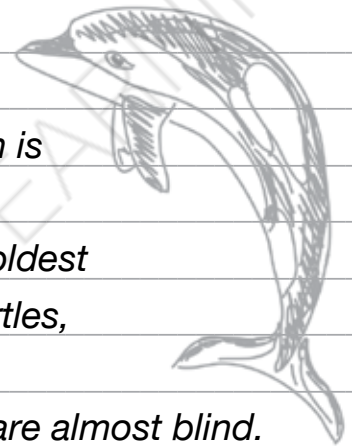
1. Do you think other animals or plants are affected by pollution?
2. What can we do to improve the situation?

Ganga Dolphins and Signs of a River's Health

 I READ

Jahnavi opened her diary and read her experiences of the journey to the River Ganga.

The worst experience of my journey was when I saw dead fish on the bank of the River Ganga. I asked a local person about them. He said, 'The river's health is not good. The river is no longer suitable for them'. He also told us that Ganga dolphins are some of the oldest creatures in the world, along with some species of turtles, Ganga crocodiles and rare fresh water sharks. 'The Ganga dolphins can only live in fresh water and are almost blind. They hunt their prey by emitting an ultrasonic sound, which bounces off fish and other prey, enabling them to visualise an image in their mind. Now, we hardly find any Ganga dolphin in the river. One of the reasons is the increasing pollution level. I can't imagine how these fishes or other creatures can live in such polluted water.'





Dad, why did the local resident say that the river's health is not good. How can a river's health be bad?

A river is a natural habitat of many animals and plants. Just like humans, animals depend on rivers for their survival. A river's good health is measured by its condition and the water in it. The quantity of animals and vegetation in rivers is one of the signs of their good health. When the river water gets polluted, it becomes difficult for the animals and plants to survive. Their number starts decreasing day by day. There was a time when thousands of dolphins were found in the River Ganga but today very few of them are left.



It means if the water is healthy, all the living beings also remain healthy.



PRACTICE AT HOME

What do you understand by, 'If the water is healthy, all the living beings also remain healthy'?



I EXPLORE

Other than water pollution, what are the different reasons behind the decreasing number of water animals in our rivers?



I READ

The presence of a high level of pollutants or contaminants in water is fatal to the animals living in it. Since animals are entirely dependent on the water they live in, they get infected by diseases, and eventually die. There are many ways by which we can prevent the contamination of water and protect water animals.



PRACTICE AT HOME

Read magazines and look up the Internet for ways to prevent and reduce water pollution. Write a few ideas that you like in your notebook.

Save our Seas



I READ



TURTLES IN DANGER

Hello friends! My name is Oliver. I am an Olive Ridley sea turtle and live with my family and friends in the sea in Odisha.

Mother turtles go to the beaches to lay eggs. The eggs hatch and the baby turtles come out.

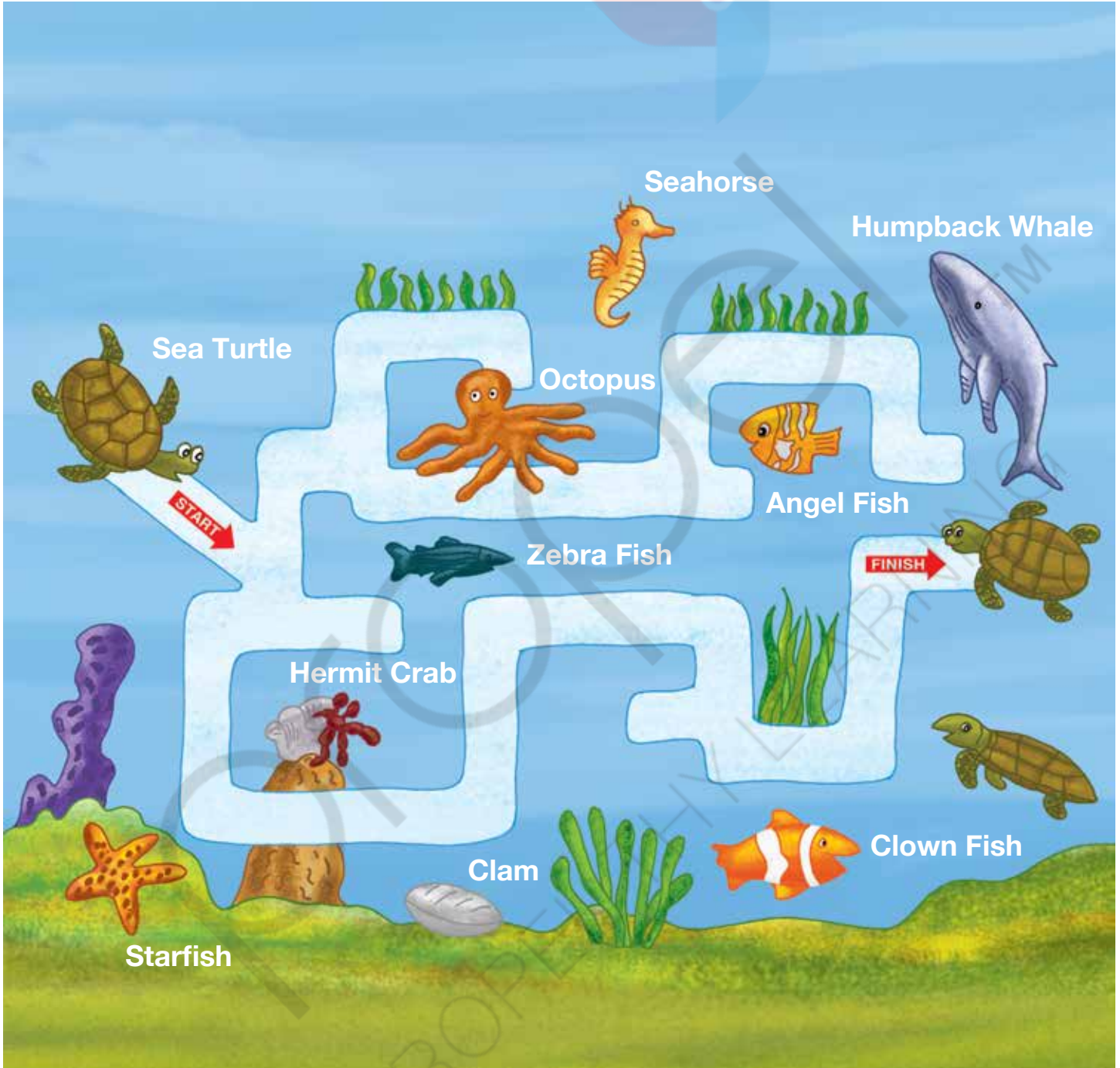
Baby turtles find their way back to the sea using light, but nowadays very few baby turtles come back to the sea. Many of them can't find their way back because they get caught in the garbage thrown by people at the seashore. Some also get confused by electric lights on the coast.

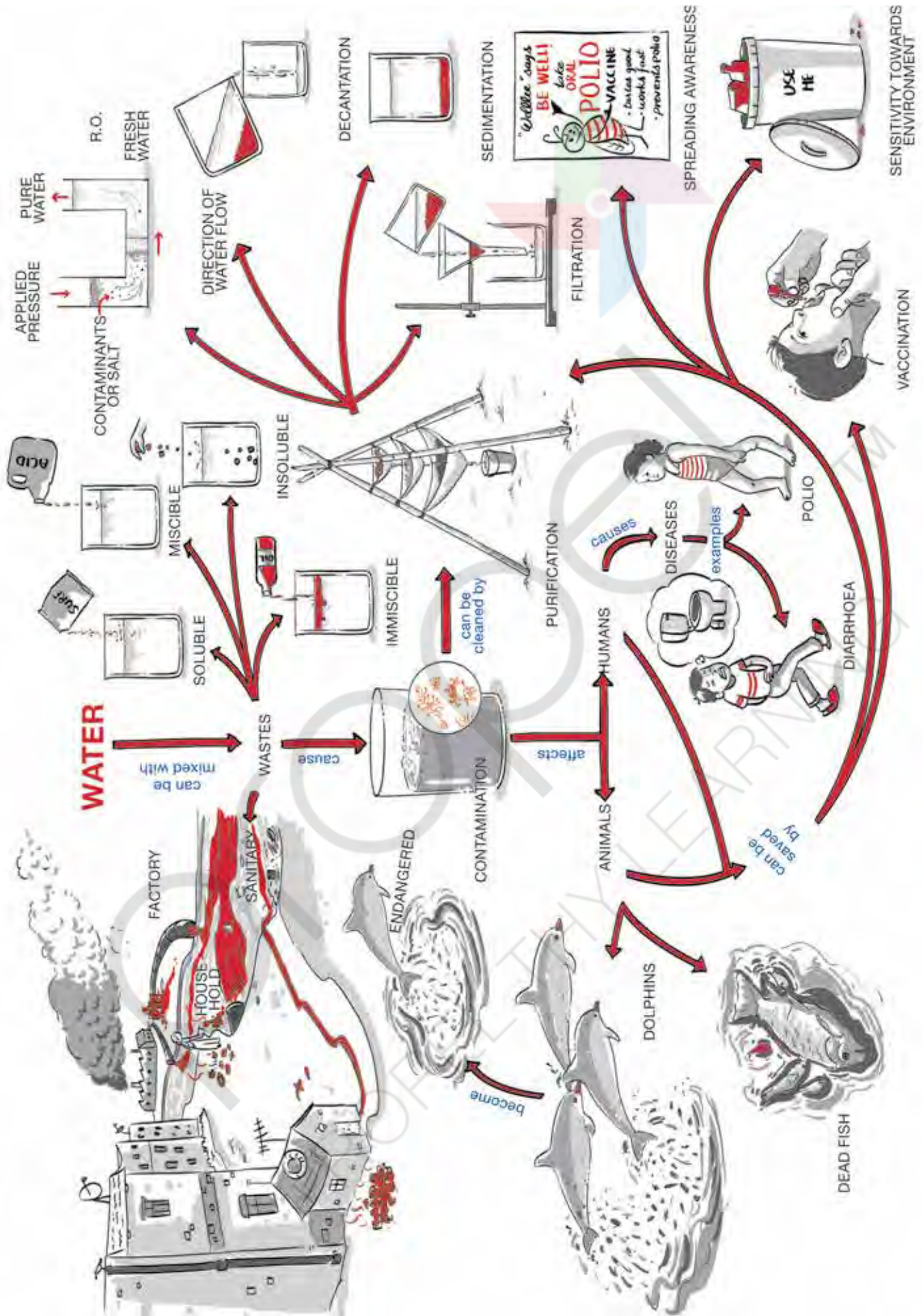
Help Your Child

Through this activity, children observe the impact of dirty water on animals living in water. This helps them visualise the condition of those animals. Encourage your child to think about some ways to prevent or even just reduce water pollution.

I also got to know that people collect huge quantities of our eggs to sell them in places they call markets. That's why a lot of our eggs don't turn into turtles! You see, we are a species struggling to survive.

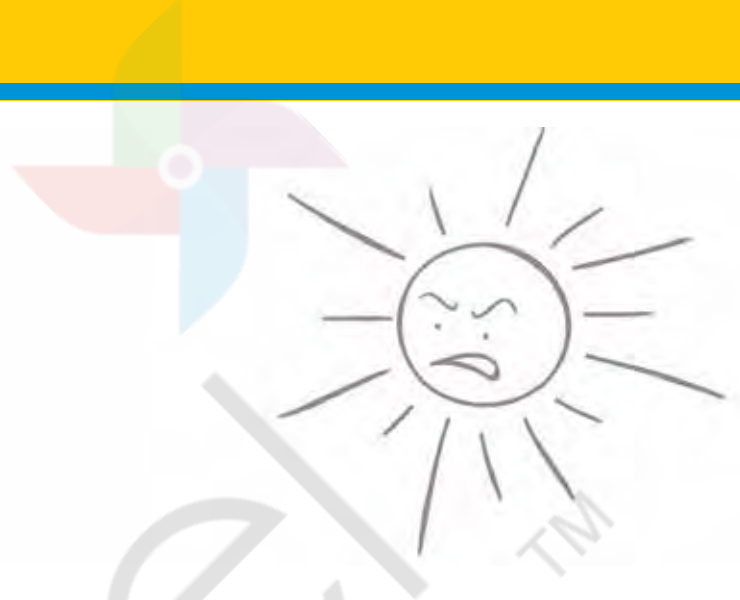
Today, I spent a lot of time meeting my friends. Look at the picture and list all the animals that I saw on the way to meet my fellow turtles.







ANIMALS



I am adapting to this hot weather by drinking lots of water and wearing a turban.

But these cacti have adapted to this heat and dryness.



This heat bothers me but I think I'll adapt in a few days.

You and I know how to adapt but plants are not that smart.

What do YOU think?

Searching Out



I ACT

Go out and do an activity with your teacher.



I REFLECT

Answer the following questions.

1. Items of which colour were the easiest to spot and collect?

2. What made other items difficult to spot?



I OBSERVE

Hide and Seek with Animals

Identify the creatures hiding in the following pictures and write down their names.











1. What strikes you about these pictures?

2. Why do you think this happens?

3. How does body covering (the colour and the pattern of skin) help an animal survive? Use the examples of the animals given in the above pictures to write what you think.



Did you face any difficulty in identifying the animals in the pictures?

Body Covering

People wear different kinds of clothes in different situations. The choice depends upon the weather or season. For instance, people wear warm and woollen clothes in cold weather, and light and cotton clothes in summers. Similarly, animals have a natural way of protecting themselves. They have different body coverings, which help them in special ways. Body covering is normally used for warmth and protection of their soft vulnerable bodies. The colour and pattern of an animal's skin often allows it to either blend into or stand out from its environment. This helps it escape from its enemies or hunt more efficiently. This special feature of animals, where they blend with their environment and appear to be part of it, is known as camouflage. For example, many animals that live in snowy areas are white to help them hide from their predators.

Many animals that live in deserts have lighter colour, like sand; many animals that live in trees are green in colour; many animals that live on rocks have colours similar to the colour of the rocks. Patterns like stripes or spots can also help in blending easily with the environment. But some animals like a few frogs couldn't care less about being seen; in fact, they WANT to be seen. It is so because these frogs are poisonous and their bright colours tell others around them that they will not taste good!



PRACTICE AT HOME

Cut out the pictures of animals that have unique patterns/colours on their skins that help them merge with the environment. Paste them in your notebook.

Amazing Animals



I READ

Read the following verses and match them to the animals they describe.

The forests, Where I always roam
Are the place, I call home.
My light-coloured coat
Is all covered with spots.
And within my rosettes,
There are even more dots.



Black Panther

I'm active at night,
But may sleep through the day,
And my fur has dark spots
On a background of grey.
I eat all kinds of prey.
Including goats called markhor.
But unlike other big cats,
I'm unable to roar.



Tiger

On padded tiptoes,
I move without sound.
I can jump twenty feet
In only one bound.
I often go swimming
Or lie under a tree.
And the stripes on my back.
Make me harder to see.



Snow Leopard

In dark forests, I ambush my prey.
And my dark-coloured coat
Doesn't give me away.
Like all other leopards,
I have spots on my back,
Though you can't always tell
Because my coat is so black.



Jaguar



Answer the following questions.

1. What helped you identify the animals mentioned in the verses?

2. How do the patterns on their skins help the animals?

Patterns on Skin

Various animal skins are shown in the following images. Observe them carefully and write what strikes you about them.



Zebra



Snake



Elephant



Dog



Tortoise



Cheetah

I observed...

1. How are these skins different from each other?
2. Do these patterns tell you anything specific about the animals they belong to?

Different animals have different skin types. Some animals have hard and scaly skin, while some have soft and furry; some have thick and rough, while some have thin and smooth skin. Apart from other characteristics, animals can be classified on the basis of their skin types.

What do I have?

Categorise the given animals based on their skin type.



Sheep



Rabbit



Owl



Fish



Bird



Tortoise



Crocodile



Peacock



Snake



Fox



Snail



Crab

| Scales | Fur and Hair | Feathers | Shell |
|--------|--------------|----------|-------|
| | | | |

Adaptation

I OBSERVE

Look at these animals' pictures carefully. Both are bears. The first one is found near the North Pole and the other one is found in Indian forests.



Polar Bear



Black Bear

I TALK

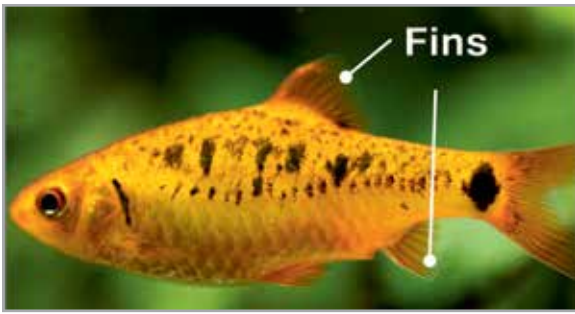
1. What are the visible differences in them?
2. What could be the reasons for these differences?

I READ

Different animals have different features, which help them survive in harsh or difficult conditions. Such features are known as adaptations.

Animals living in different habitats have different adaptations. Animals living in cold areas like polar bears and penguins have thick fur or feathers on their bodies. They store food under their skin, which is also known as blubber. Penguins have a waterproof coat of feathers to help them survive in extremely cold and wet conditions.





Fish

Aquatic animals living in water have **streamlined bodies**. They have structures, such as fins in a fish, **flippers** in a turtle and **webbed feet** in a duck, which help them swim in water. Most aquatic animals have gills. Gills help them absorb oxygen from water, which is essential for living.

Camels live in deserts, which are extremely dry and hot. They have adapted to survive in such conditions. They have an ability to go without water for many days. They urinate very little and hardly ever sweat. They have **broad, padded** feet that help them walk easily on the sand. They have **long eyelashes** to keep away dust and sand from their eyes during sandstorms.



Camel



Organisms adapt to their surroundings so that they survive and thrive. This happens in two ways – structural adaptation and behavioural adaptation.

Structural Adaptation

The bill of a bird is pointed to help it pick up worms from holes of trees. This kind of change in the feature of the body of organisms that helps them survive is called **structural adaptation**.

Animals show many types of structural adaptations. Let us read about a few.



Woodpecker

Camouflage



Chameleon

A chameleon is a terrestrial animal. It can **change its colour** according to its surroundings. Mixing with its surroundings saves it from being spotted by other animals and helps it in hunting its prey. This process of camouflage also makes animals such as spiders hide and hunt their prey.

Mimicry

Some animals and plants **look like other things**, i.e., they mimic them. Mimicry can protect the animals from predators or hide them from their prey. For example, the poisonous **coral snake** and the harmless king snake look alike a lot. Predators will avoid the king snake because they think it is poisonous. A harmless species mimics a toxic or dangerous species and saves itself.



Coral Snake



Walking Stick

A **walking stick** looks so much like a twig that it's easy to overlook it. Sitting on a plant or its leaf, it looks like a perfect twig!

A **dead leaf butterfly** looks brilliant when its wings are open and flat—they have many colours and shapes. But when its wings fold up they look like leaves—sometimes green, sometimes brown, as if fallen and dead. The likeness to a dead leaf is remarkable.



Dead Leaf Butterfly

Behavioural Adaptation

The other type of adaptation is where the behaviour of an organism changes; for example, birds migrate to other places. This is called behavioural adaptation.

Migration

Some animals travel relatively short distances to find food or more favourable living or breeding conditions.



Crabs

Crabs migrate to places where they can lay their eggs safely. In many species the females move into shallow coastal waters to lay their eggs. Thereafter, they return to deeper ocean waters.

Frogs and toads often move very short distances to ponds and lakes to lay their eggs. Some sea turtles, like the loggerhead, return year after year to the same sandy beach where they were hatched to lay their eggs.



Frog



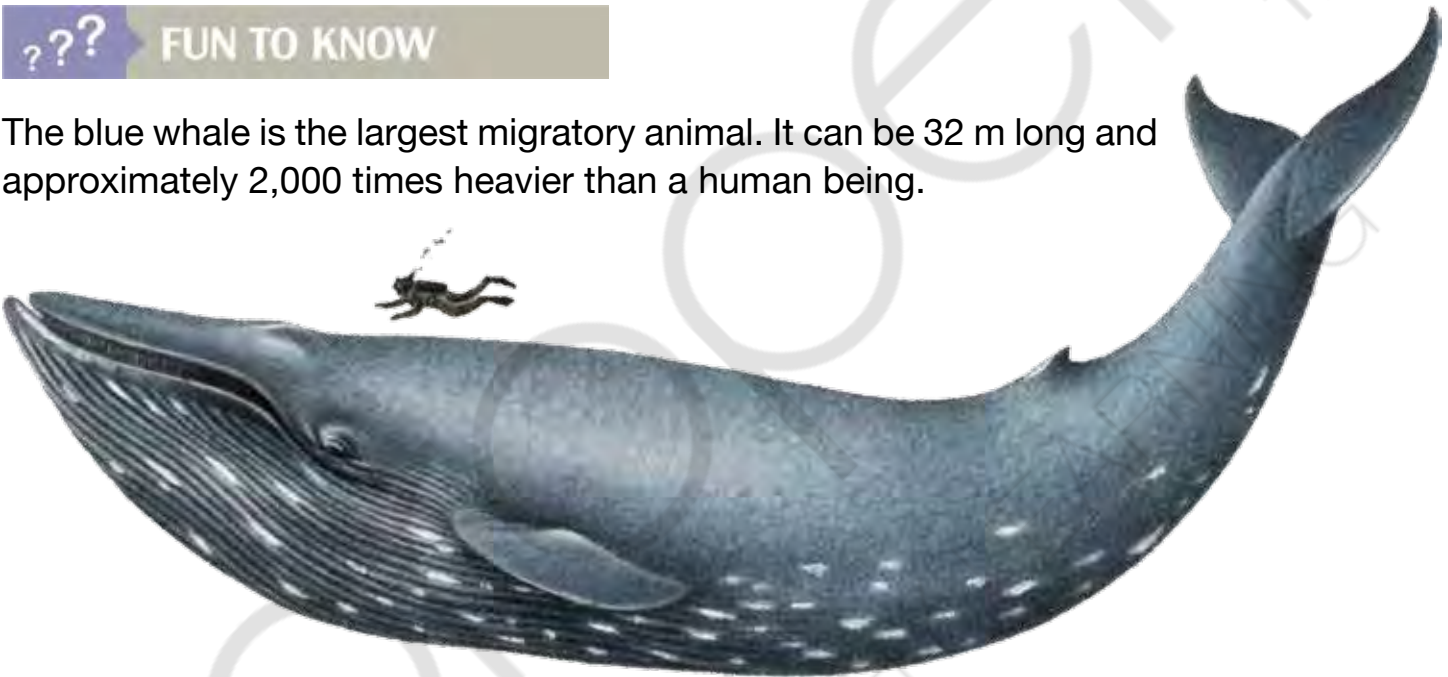
Brown Bats

Sometimes, animals migrate to find a place to hibernate. Little brown bats live in trees in warm months. In cold weather, they migrate to caves where it is warmer.

???

FUN TO KNOW

The blue whale is the largest migratory animal. It can be 32 m long and approximately 2,000 times heavier than a human being.



 **PRACTICE AT HOME**

In your notebook, paste the pictures of some animals that migrate from one place to another, under the heading 'Migratory Animals'.

Copy the following table in your notebook and write about any five migratory animals.

| Animals | Reasons for their migration |
|---------|-----------------------------|
| | |



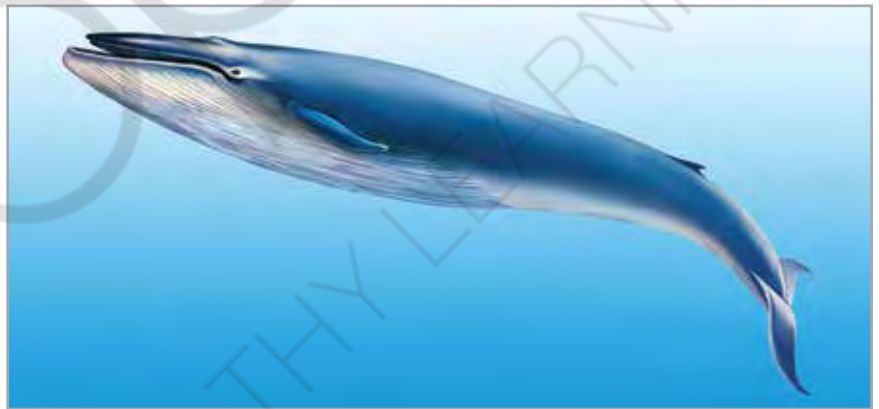
FUN TO KNOW

A seahorse is not a horse. It is actually a fish. It uses its fins to swim.



Eels look like snakes. But they are actually fish. They are often called fake snakes.

The blue whale looks like a fish, has fins like a fish but it is not a fish; it is a mammal as it does not lay eggs but gives birth to young ones directly.



I EXPLORE

Explore the given link to know more about animal migration.

<http://www.nature.com/scitable/knowledge/library/animal-migration-13259533>



This task helps children learn about migratory animals and the reasons for migration. You can take your child to a bird sanctuary so that he/she gets a real-life experience. Encourage him/her to find out information about other migratory animals.



Hibernation

As the weather gets colder, you may find it hard to wake up in the morning; but don't worry, you aren't the only one. There are some animals that don't get up at all and stay asleep all winter!

It is difficult for some animals to tolerate cold temperatures, and also to find food. Hibernation is an adaptation for many mammals and reptiles that allows them to survive much of the winter. During the coldest months, many animals find places such as a cave or deep burrow to hibernate in. This keeps them protected from cold temperatures and predators. During the months before hibernation, they eat a lot to build up a thick layer of fat in their bodies. While they are sleeping, the layer of fat not only keeps them warm, but also provides them with the nutrients they need.

Hibernating animals fall into deep sleep, their heart rates slow down and their body temperatures reduce. This helps them survive on very little energy. They sleep until the weather gets warm. Then they come out, find food and resume their regular activities.

A few animals like the squirrel and prairie dog are only partial hibernators. They occasionally wake up during the winter, come out from their hiding places and look for food or water. This partial hibernation is called torpor.



Become an animal researcher! Find one interesting fact about how the following animals hibernate:

- Black bear
- Grizzly bear
- Butterflies and Moths
- Hedgehog
- Frog
- Mouse
- Squirrel
- Bat

Here are some resources you may use:

- <http://www.earthrangers.com/wildwire/top-10/top-ten-hibernating-animals/>
- <http://www.enature.com/articles/detail.asp?storyID=409>

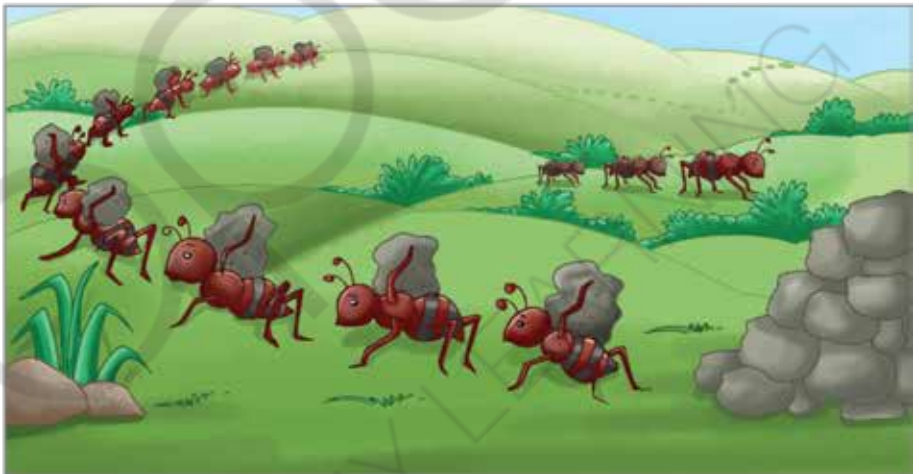
Super Senses



I OBSERVE

Observe the following pictures.

Have you seen any of this before?



I TALK

1. Is any of the above scenes familiar to you?
2. What is common in the activities shown in these pictures?
3. How do ants locate sugar or food grains even from far-off places?
4. Why do ants always walk in a line?
5. Whenever we walk close to a sleeping dog, why do its ears shoot up at once?
6. How does a snake get to know that someone is moving towards it?
7. How does an eagle catch a mouse running in a field?



Alert dog at airport sniffs drugs 20 feet away, helps in ₹3 crore seizure

MUMBAI: The customs checking in to board an department's newest Ethiopian Airlines flight recruit, a sniffer dog named at around 4.30 a.m. at Aniy, on Tuesday morning the airport's international helped officials catch a terminal.

woman passenger trying to smuggle 16 kg of drugs, valued at ₹3.20 crore, out of the country. A search of her baggage revealed the presence of drugs. It had been concealed in cardboard packets which were wrapped in laces to avoid suspicion. Potgieter was arrested and booked under the Narcotic Drugs and the passenger, Thalitha Psychotropic Substances Potgieter, when she was (NDPS) Act.

Aniy, who joined the customs' Air Intelligence Unit (AIU) barely two months ago, dragged its handler in the direction of the Narcotic Drugs and the passenger, Thalitha Psychotropic Substances Potgieter, when she was (NDPS) Act.

Chinmayi Shalya
TNN | Dec 4, 2013, 04.01 AM IST



-Adapted from The Times of India



1. What do you understand from the news clip given above?
2. How do you think the dog found the drugs?
3. Why do you think the Narcotics Department uses dogs to detect such illegal things?
4. Why are only dogs (and no other animals) used by agencies like the police?



All humans as well as animals have different senses. These include the senses of sight, sound, taste, smell and touch. These senses help detect danger so that they can protect themselves. They also enable them to find food and shelter. Animals use their senses with the help of specific sense organs, like we use our ears to hear sounds. An organ or part that is sensitive to stimuli like sound, touch or light, is called a sense organ.

Eagles have some of the best eyes of all animals. They look for food on the ground while they are flying high in the sky. An eagle can spot its prey (a rabbit or a mouse) from up to a mile above the ground.



Dogs' special ability to smell even from a distance has been utilised by people for a long time. Sniffer dogs or 'search and rescue' dogs are specially trained dogs. They are often used by the emergency services, such as finding missing people in situations like avalanches, building collapses, floods, explosions and earthquakes.

They guide the rescue workers to know where the victims can be found. They can also smell bombs and alert the police in advance.



Sniffer dogs help the police in finding bombs or other explosives in public places like railway stations.



PRACTICE AT HOME

1. Talk to people at home to find out about any animal that has a special sense. Write about it and share the information with your class. You can also draw it in the given space.

PROPEL THY LEARNING™

2. Find out and write about an animal whose amazing sense of smell helps its survival.



I READ

Let us read about special senses and their significance for different animals.

Special Sense Organs



African elephants have the biggest ears on the earth. They can hear low, rumbling sounds from miles away. An elephant's ears aren't just good for hearing. The elephant waves its large, thin ears to cool its blood. The cooled blood travels to the rest of the elephant's body to cool it down.



A fennec fox is the smallest member of the fox family, but it has the biggest ears among them. It lives in the hot desert and usually hunts at night, when it is cooler. In the dark, the fox relies on its super-sharp hearing sense to find beetles and crickets crawling across the sand.



A rabbit's large ears catch even the faintest sounds. The little rabbit doesn't need to turn its head. It turns its long ears to find out where the sound is coming from. Then it quickly hops in the opposite direction to save itself from a possible enemy.



Large, floppy ears could freeze in icy water. That's why a polar bear has small ears covered with thick fur. When a polar bear goes swimming it closes its ears so that water will not trickle in.

Sensing the World Differently

1. You do not see in the same way as a starfish
2. You do not touch in the same way as a cat
3. You do not taste in the same way as a butterfly
4. You do not smell in the same way as a snake
5. You do not hear in the same way as a cricket

Let us learn about these animals:

Sight

We use our eyes to see, but starfish use their arms! Starfish do not have eyes, so they can't see. However, small spots at the ends of their arms help them tell the difference between light and dark.



Touch

If your eyes are closed, how can you tell the difference between a soft chick and rough sandpaper? In this situation, you use your sense of touch. While you use your skin for touching, cats do this with the hair on their faces. The long hairs on a cat's face are called whiskers. Cats use their whiskers to let them know whether they can fit through small openings.

Taste

Think about your favourite food. You thought about it because you like it. How? You must have eaten it, i.e., tasted it through the taste buds on your tongue. But butterflies taste with their feet! When butterflies land on flowers, they use the taste buds present on their feet to know if the juice of the flowers is good to sip.



Smell

Do you like the smell of fresh flowers? Or the smell of garbage? Most of you will prefer flowers. Your nose tells you that flowers smell good, but garbage smells bad. Snakes use their tongues to smell.

Hearing

Your friends whisper a secret to you. How do you know what they are saying? You use your ears to hear, but crickets use their legs to do that. Crickets don't have ears on their heads as we do. Instead, they have ears near their knees. The small white dots on the cricket's front legs are actually its ears.



Dancing Snakes



Sparsh was amazed at the wonderful world of animals after reading about their senses. He told his mother how dogs and other animals sense the world differently.

While returning from the market, Sparsh saw a crowd gathered around a man. He and his mother went closer to see what was happening. The people were watching a snake charmer.



The snake charmer was wearing traditional dress. He had some snakes in a basket made of cane. He was blowing into his been and it sounded very pleasing. He moved it along and stroked the snakes gently. One snake raised its head up and moved its body as the music of the been went on. Sparsh was amazed to see this. He asked his mother, 'Mummy, this means the snake has special ability to dance to the tune of the been.' His mother replied, 'Not really'.

1. Do you think that the snake was dancing to the tune of the been? Why?

2. Why do you think Sparsh's mother said, 'Not really'?

Mother explained her response to Sparsh, 'Snakes do not have ears. When the snake charmer stroked the snake, it got active and raised its neck out of the basket.'

Sparsh asked, 'But if it cannot hear then how was it dancing to the tunes of the been?'



MISCONCEPTION ALERT

Snakes dance to the tune of the been

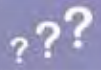
A lot of people think that snakes dance to the tune of the been but it is not true because they don't hear sound the way we do. The snake charmer moves his hand and the been as he plays it. Seeing the moving been or hand, the snake moves its body in that direction.



PRACTICE AT HOME

Explore and find out about animals who use their organs differently from us; for example, the snake uses its tongue to smell something.

| Purpose | Animal | Organs they use |
|---------------------|--------|-----------------|
| To locate something | | |
| To feel something | | |
| To taste something | | |
| To smell something | | |



FUN TO KNOW

Many species of spider have very sensitive nails at the ends of their limbs. They help them pick up various kinds of movements around them. They also use them to taste and smell.

We have just learnt that many animals have a highly developed sense of smell that protects them and helps them live longer.

Let us look at another very important sense that some of them use to survive.

After the Sun Sets

You must have heard some sounds in a garden. For many animals, the setting of the sun marks the beginning of a 'new day'. These are nocturnal animals.



Cricket



Scorpion



Cockroach

Who are Nocturnal Animals?

Nocturnal animals are those who come out of their hiding places during the night. Some nocturnal animals can also be seen during the day but others spend the entire day resting or sleeping. They live in quiet places. Many rodents come out to look for food during the night. These animals may have taken up nocturnal living in order to avoid being eaten by animals active during the day. Another reason is that some animals have senses that are better suited for the night environment. For example, owls have very poor eyesight during the day, but can see better at night. They have two large eyes. They can turn their heads full circle to see on all sides from one place. Many nocturnal animals have poor eyesight. They rely on other senses like touch, feel and smell.



Can nocturnal animals hear well?

Often nocturnal animals need their ears more than their eyes. They can hear very faint sounds. In addition, they can distinguish between various sounds such as sounds of leaves, air or that of other animals.

Bats have difficulty seeing clearly (except white colour), but have a heightened sense of hearing. They are so good at listening that they can catch insects flying in mid-air based on the sound they make.



Where can you see nocturnal animals?

Most people don't see nocturnal animals very frequently. When these animals come out, most of us are usually sleeping, but that doesn't mean we can't see them during the day. They spend their daytime at quiet places where they can relax or hide from their enemies. For example, we can see mice during the day too, but they mostly start looking for food at night or in the dark.



PRACTICE AT HOME

List any four nocturnal animals other than those mentioned in this section and complete the following table to summarise what you have learnt about them. Use the Internet or reference books to find out additional information.

| Nocturnal animal | How does it find food? | Interesting Facts |
|------------------|------------------------|-------------------------------------|
| Owl | Special way of seeing | It can clearly see far-away things. |
| | | |
| | | |
| | | |

What is the common feature of these animals?



My Super Animal

I can walk like an elephant,
I can see like an eagle,
I can swim like a fish,
I can jump like a frog,
I can smell like a moth,

I am a super animal with super senses.

You learnt so much about animals and their super senses. Now, it's time to create your own super animal. To create such a super animal, you need to select all the five senses from those animals that have the best of them. For example, you can select owl's eyes for your super animal because it can see at night; in addition, you can select eagle's eyes.

Write which animals you will choose for a particular sense. Give a name to your super animal.

1. Sight _____
3. Taste _____
5. Smell _____

2. Hearing _____
4. Touch _____



Living Together

Observe the following pictures.





1. What is common in these pictures?

2. Why do you think animals behave in this way?

We all have had an experience of being in groups like our family, school or perhaps even dance classes. In a group like a family, we were born as part of it. On the other hand, we have chosen to be part of other groups for common purposes. For example, we come to school to study. Living in groups, herds or colonies is an important behaviour of animals. Find out the names of some animals that live in groups.



Many animal species live in groups. There are specific terms that are used to describe groups of particular animals; for example, a herd of sheep. Here are a few more for you.

- 1. A kaleidoscope of butterflies
- 2. A quiver of cobras
- 3. A murder of crows
- 4. A drove of bullocks
- 5. A colony of ants
- 6. A congregation of alligators



I EXPLORE

Find out the specific name for the group of following animals.

- 1. A group of jellyfish : _____
- 2. A group of kangaroos : _____
- 3. A group of monkeys : _____
- 4. A group of owls : _____
- 5. A group of zebras : _____
- 6. A group of buffaloes : _____
- 7. A group of lions : _____
- 8. A group of birds : _____



Children observe different animals during the day and night. With this discussion, we bring their attention to the animals that are most commonly seen during the night. They are also introduced to the term 'nocturnal'. You can take your child to a garden in the evening to observe and talk about animals that become active during the night.

Symbiotic Relationship

You may have heard stories of true friendships between two human beings and sometimes, between a human being and an animal, but have you ever heard of a friendship between two animals? Let's read about the story of one such relationship.



The Buffalo and the Egret

A buffalo was searching for a safe place to graze when an egret landed on its back.

'Do you mind?' asked the buffalo.

'Not at all,' said the egret. 'Do you?'

'Well, yes I do,' said the buffalo. 'You are intruding into my personal space!'

'But have you considered,' asked the egret, 'the advantages of having an egret on your back?'

The buffalo was surprised at the question. What could be the advantage of a tiny bird, he wondered.

'I'm a status symbol,' said the egret, 'and I can keep you free from ticks (small insects that live on the blood of humans and animals) and pests and, most importantly, I can lead you to fields where you will get plenty of grass.'

Now this impressed the buffalo. He was absolutely starving because the grass had dried up. He always found it difficult to find enough vegetation to support his enormous body. He was also constantly plagued by ticks and pests. 'If what the egret says is true, this could make my life a good deal easier,' thought the buffalo. 'All right,' said the buffalo, 'we're on!' So the egret settled on the buffalo's back.

You can see pairs of animals often in fields where birds are sitting on different animals. A relationship where animals benefit from each other for food or any other need is known as a **symbiotic relationship**.





I WRITE

What makes the relationship between the egret and the buffalo symbiotic?



FUN TO KNOW



Just like the egret and the buffalo, the impala and the oxpecker also have a symbiotic relationship.

The oxpecker helps the impala remove the ticks from its skin. The oxpecker not only takes off the ticks, but also combs the fur of the impala with its beak. The oxpecker also cleans infected cuts and sores. It is nature's veterinarian and hairdresser, two in one.



I EXPLORE

Just like buffalo-egret and impala-oxpecker, many animals form symbiotic relationships. Find out an example of such animals and write about them in the given space.



Through the above story, children get to know about interdependence among animals and how they help each other in their own ways.



PRACTICE AT HOME

1. Find a picture of an unfamiliar animal. You can cut it out from a magazine or a newspaper. Now, list the unique characteristics of that animal and how you think those characteristics help it survive.
2. List ways in which humans artificially adapt to extremes in their environment. For example, coats in winter, air conditioners in summer.



I PRACTISE

1. Choose five animals and explain how their feet are uniquely adapted to their environments. You can use the resources from the library and internet.
2. Make a chart in your notebook (as given below) and classify how the animals' adaptations help them survive in their habitat.

| Animal | Its habitat | One structural/ behavioural adaptation | How the adaptation helps the animal |
|--------|-------------|--|---|
| | | | |
| | | | |
| | | | |
| | | | |



I EXPLORE

In groups of four, develop a set of 'why do' questions about animals; for example: Why do zebras have stripes? Why do camels have long legs? Do the research to find the answers and prepare charts. Have a quiz in the class. Ask other groups to answer your questions and vice versa. Put up the charts in your class. Read the charts of other groups.

