

WHEN PLANTS ADAPT

Learning outcomes

At the end of the lesson, students will be able to:

- explain why plants adapt or change
- describe how different types of plants have adapted to their habitat and climate
- describe the special features of some plants,
- explain the process of seed dispersal
- recognise the forest as a self-sustaining system
- describe the things we get from plants

Resources needed

- Course Book

Session plan at a glance

Session plan at a glance	
Session 1	Session 2
<ul style="list-style-type: none"> ● Instruct the students to read the 'Dive in' section. Guide them to complete the activity. 	<ul style="list-style-type: none"> ● Draw their attention to the picture of the polar bear and the fish in the course book. ● Introduce the terms Habitat and Adaptation. ● List the reasons for adaptation.
Session 3	Session 4
<ul style="list-style-type: none"> ● Encourage the students to complete the activity on special features of different plants. Guide the students to analyse the need for these special features. ● Explain the adaptations found in trees of evergreen and deciduous forests. 	<ul style="list-style-type: none"> ● Explain the adaptations found in the plants of the deserts and cold regions. ● Explain the adaptations found in aquatic and aerial plants.
Sessions 5	Session 6
<ul style="list-style-type: none"> ● Explain seeds, adaptation in seeds, dispersal of seeds, and the four mechanisms of dispersal of seeds. ● Explain forests as self-sustaining systems. 	<ul style="list-style-type: none"> ● Instruct and encourage students to complete all the exercises and activities at the end of the lesson.
Sessions 7	
<ul style="list-style-type: none"> ● Help and guide the students to answer the question bank in the teacher resource pack and the worksheets. ● Encourage the students to take one step further and design / create a new tree with unique adaptations 	

Teaching Guidelines:

Session 1 Dive in activity

- Divide the class into pairs. Instruct the students to study the pictures and list the differences between the two trees/plant. (Appearance, size, texture, surroundings (they should take a guess) and answer the questions)
- Invite students who have cactus plants at home to talk about it. How do they differ from other plants/trees at home?

Session 2 Pre-teaching exercise, Introducing adaptation

- Share pictures of variety of animals from different habitats either as a presentation or video. Divide the class into groups of four. The students should discuss among themselves and make note of the characteristics of these animals and their surroundings.
- Draw their attention to the polar bear and the fish in the coursework.
- Elicit answers from them for questions on: where is the polar bear? How does it look? How can it survive the cold weather? Where do fish live? How do they breathe underwater? Can they live on land? The bear lives on land of ice and snow. This is its habitat. To survive the cold, it has thick fur. That is adaptation. Fish live in water, that is its habitat. What does it have to live in water? It has gills and fins to help it survive in water. That is adaptation.
- Make students read the definitions given in Ant bytes and also under Keywords.

Session 3 Adaptation in plants living in tropical evergreen forests and deciduous forests

- Explain plant adaptation and the need for it. Guide the students to complete the activity on 'visit the nursery'.
- Take them to see different plants in the garden/nursery in school. Help them to complete the activity by filling the table.
- Compare the conditions in tropical evergreen forests and deciduous forests based on the information given in the course work. Help them to tabulate the information.

Tropical Evergreen Forests	Deciduous Forests
<ul style="list-style-type: none">● Very heavy rainfall almost daily● Dense forests <p>Adaptation of trees in temperate forests:</p> <ol style="list-style-type: none">1. trees grow tall, have a thick canopy2. roots grow close to the surface3. broad leaves with a drip tip4. smooth bark	<ul style="list-style-type: none">● Rain only during rainy season. They experience dry season for the rest of the year, <p>Adaptation of trees in deciduous forests:</p> <ol style="list-style-type: none">1. trees shed their leaves during the dry season2. roots grow deep inside the surface in search of water

- Explain transpiration and drip tip. Discuss why do the roots of the trees of the evergreen forests spread closer to the surface and roots of the deciduous forests go deep inside the earth.

Session 4 Adaptation in plants living in deserts and cold regions

- Explain the climatic conditions of the deserts and cold regions. Discuss how plants survive in deserts and cold regions. The student could role play as cactus and pine trees. They talk about their adaptations and how that helps them to survive in their habitats. Encourage the students to read activity time and understand rare and unusual adaptation in plants. Allow the students to share their learning using different modes of their choice.
- Explain adaptation in aquatic and aerial plants. In pairs the students read Ant- Bytes and write a short note on the types of aquatic plants, their unique features and how have they helped them to survive in water.
- Instruct the students to sketch an aquatic plant. In two lines, explain their adaptation to survive.

Sessions 5 Dispersal of seeds

- Explain the dispersal of seeds and the need for it. Describe the four types of dispersal mentioned in the text and explain how the seeds are adapted for different types of dispersal. Divide the class into groups and instruct them to read Ant-Bytes on dispersal of seeds. Each group should explain one mechanism of dispersal. Draw the different modes of dispersal of seeds on the blackboard. The students should draw and justify the need for dispersal of seeds.
- Give instruction to the students to complete the activity on seeds. Provide appropriate guidelines to complete the project. Fix a date for showcasing the project. Have rubric in place to enable students to assess their projects and the projects of their friends (self and peer assessment)
- Explain the self-sustaining nature of a forest system. Analyse the different aspects of a forest that makes it a self-sustaining system. Encourage the students to use a dictionary and find meanings for the words highlighted in red in Ant-Bytes on forests as self-sustaining systems.

Sessions 6 Exercises at the end of the lesson

- Instruct the students to learn the key words. Give them a picture dictionary or invite interested students to make a picture dictionary for all the key words. Encourage the students to complete the exercises under reflect and learn.
- Help students to answer the questions: Discuss the answers orally first, refer to the answer section in teacher resource pack.

Sessions 7 Question Bank, Worksheet, One step further

- Discuss questions from the Question Bank in the Teachers' Resource Pack.
- Make required number of photocopies of the worksheet given for the lesson and distribute them to students.
- Instruct them to complete the worksheet.
- Encourage the students to read One step further and design a new tree with unique adaptations. Remind the students of the instructions to design the unique plant that can adapt to survive in a region experiencing extreme heat and frequent floods. Encourage them and check on them frequently. Share a timeline with the students. Insist on completing and submitting the project on time.

QUESTION BANK WITH ANSWER KEY

When Plants Adapt

I. Give one word for:

1. The natural home a plant or animal lives in:
2. Trees of this type of forest compete for sunlight:
3. A plant with broad leaves and waxy coating:
4. Plants that absorb carbon dioxide from the water

Ans: 1. habitat b. tropical evergreen forest c. lotus plant d. submerged aquatic plants.

II. Choose the correct answer.

1. Coconut trees grow well in _____ areas.
a. swampy b. hilly c. desert d. coastal
2. These trees have needle shaped leaves.
a. Teak b. Banyan c. Pine d. Mahogany
3. Plants that grow on other plants or rock surfaces instead of soil are called:
a. Floating plants b. Aerial plants c. Emergent plants d. Submerged plants
4. This plant lives its entire life totally submerged in water:
a. Hydrilla b. Lotus c. Xanthium d. Water lily

Ans: 1. d. coastal 2. c. Pine 3. b. Aerial Plants 4. a. Hydrilla

III. Answer the following.

1. List the four main mechanisms of dispersal of seeds.
2. How do submerged aquatic plants survive?
3. To what do plants adapt?
4. Where are teak trees found? How have they adapted to survive?

Ans: 1. Dispersion by wind, water, animals and dispersion by explosive mechanism are the four main mechanisms for dispersal of seeds.
2. Submerged plants live completely under the water. They have thin, flexible stems and thin, narrow leaves that drift with the water current. They can absorb carbon dioxide from the water. These adaptations enable them to survive under water.
3. Plants adapt themselves to climatic conditions and their habitat. Their adaptations help them to compete for space, air and water. They also adapt to protect themselves from predators.
4. Teak trees are found in the tropical deciduous forests. Trees of the tropical deciduous forests shed their leaves during the dry season to conserve water. They have long, extensive roots that go deep inside the Earth's surface in search of water.

STUDENTS' BOOK ANSWER KEY

When Plants Adapt

- I. 1. c. broad with a drip tip
 2. c. to store water
 3. c. wind
- II. 1. Very cold regions and high mountains experience heavy snow fall. The trees of these regions are cone shaped to allow the snow to slide off the leaves. Their supple trunks, long and deep roots and the needle shaped leaves also help them survive the cold climate.
 2. Lotus is an aquatic plant. Its broad leaves float on water, capture sunlight and produce food. The waxy coating keeps the leaves dry as the excess water slides off the waxy leaves.
 3. A forest can sustain itself without any external help because all the organisms in the forest depend on each other. The plants produce food through photosynthesis. All other living beings in the forest depend on plants either directly or indirectly for food. The decomposers such as insects and fungi break down dead plants and animals and return nutrients to the soil. Old plants and animals are replaced by new ones. This enables the forest to sustain itself for a long time.
- III. 1. Plants adapt themselves to survive in their habitats. Plants adapt to survive in their climatic conditions, to protect themselves from predators and to get the air, water and space they need.
 2. The seed of a coconut tree is dispersed by water. Coconut has a hard shell to protect it from decay and is soft and fibrous inside. This allows it to float on water and get carried away to a different place where it can germinate and grow.

a.



b.



c.



- a. Coconut tree on shore, b. Coconut seed floating in water, c. Coconut seed germinating on another shore
3. Animals eat fruits and throw away the seeds. The seeds fall onto the ground, germinate and grow. Few animals store the nuts, seeds and fruits underground. This too leads to germination and growth of plants. Seeds also germinate from animal droppings.
4. As a desert plant I would like to have long roots, fleshy stems, waxy coating and thin prickly leaves. My long roots will grow close to the surface to absorb water as soon as it rains. My fleshy stems will help me to store water. The waxy coating will reduce transpiration and prevent me from losing water. The thin needle like leaves called spikes will protect me from being eaten by animals of the desert and also prevent loss of moisture.

IV. Compare and contrast:

Habitat	Root	Stem	Leaves
Plants of the evergreen forests	Strong roots closer to the surface to hold the tree in place.	Tall, thick, smooth trunk to let the water drain away.	Broad leaves to collect sunlight and drip tip to drain excess water.
Plants of the desert	Long roots close to the surface to collect water as soon as it rains.	Fleshy and succulent so as to retain as much water as possible.	Thin narrow and needle shaped to reduce loss of water and also as a defence from being eaten by animals.

V. Picture-based questions.

1. The plant shown in the picture belongs to the tropical deciduous forest because the plant has shed most of its leaves and the leaves that are still on the plant have partially or fully dried.
2. Trees and plants of the tropical deciduous forests shed their leaves during the dry season, hence we can infer that the picture was taken during the dry season as the leaves in the image have dried and are on the verge of being shed.
3. The plant in the picture has thorns to protect itself from being eaten by animals.

WHEN PLANTS ADAPT

A. Look at the images. Name the mechanism of dispersal and explain the process.



B. Complete the crossword puzzle with the help of the given clues.

Down:

1. a system that can maintain itself without by external help or effort

Across:

2. the process by which old is replaced by new

3. fleshy stems and leaves that can store water

4. organisms that break down dead leaves and plants and return the nutrients to the soil

5. plants that grow on other plants, rocks or buildings and not in soil

6. seeds of a plant that have tiny spines and hooks



