Ecology in Classrooms & Outdoors

PLANT CHARACTERISTICS TEACHER GUIDE

INTRODUCTION

In this lesson, students take a closer look at plant ecology by learning common characteristics of leaves and leaf structure. Then, students head outdoors to find leaf characteristics in their neighborhood or nearby green space. Finally, students are encouraged to spend time learning more about the plants they observe through extension activities such as poetry, research, or art.

MATERIALS

- Plant Characteristics instructional video
- Plant Characteristics activity sheet
- Plant Characteristics worksheet
- Pencil
- Colored pencils, if desired

GUIDING QUESTION

What are the similarities and differences between leaf structures?

NEXT GENERATION SCIENCE STANDARDS

4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior and reproduction.

MS-LS1-6 Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

LESSON PROCEDURE

1. Introduce leaf characteristics

Explain to students that they are going to investigate and identify different types of plants by learning the **characteristics** (things they notice about the appearance) of leaf samples. Not all plants look alike, and the leaves are one of the most obvious differences. Before explaining the different characteristics, review the importance of leaves.

ASK: WHY ARE LEAVES IMPORTANT TO PLANTS?

Leaves may look different from plant to plant, but they all provide the same function: taking in the sun's light energy and carbon dioxide from the air to complete the **photosynthesis** process. For photosynthesis to take place, plants need sunlight, carbon dioxide, and water. This chemical reaction creates the food plants need to survive. In turn, plants release oxygen and water vapor into the air.

There are three types of characteristics that they will learn about in order to do the activity. These characteristics, shown on the activity sheet, are:

- **leaf edge:** what the edges or margins of the leaf look like
- **leaf arrangement:** how the leaves are arranged on the stem
- **leaf veins**: the structure that carries water and nutrients throughout the leaf

2. Leaf edge

Have students make observations of the images on their activity sheets to understand how a leaf edge, or perimeter, may look **smooth**, **toothed** (like a saw edge), or **lobed** (like ear lobes). Show students that leaves may be lobed and have smooth edges, or lobed and have toothed edges.

3. Leaf arrangement

Opposite leaf arrangements are symmetrical (leaves are growing directly across from one another on the stem). **Alternate** leaf arrangements are not symmetrical on the stem, they are staggered.

4. Leaf veins

The final characteristic students will look at is the veins in a leaf.

There are three ways veins are arranged in a leaf: **pinnate**, **palmate**, and **parallel**. In pinnate leaves, there is a primary vein that runs up the center of the leaf with smaller veins branching off of the primary vein in a feather pattern. In palmate leaves, there are multiple large veins that start from the same point at the base of the leaf, with smaller veins branching off of each large vein. Finally, in leaves with parallel veins, the veins run parallel to each other from base to tip.

5. Explain the activity

Have students watch the Plant Characteristics video and download and print the Plant Characteristics activity sheet and worksheet. If students do not have access to a printer, students may use the activity sheet and worksheet on a mobile device and use a piece of paper or journal for their sketch.

Invite students to go outdoors and find a plant that they want to sketch. Remind students that a scientific sketch should fill the entire space and include as many details as possible. Using the characteristics on the worksheet, students should draw arrows from the word to the sketch. They may use color.

Feel free to assign multiple sketches to each student, having them choose a different plant each time. Alternatively, have students pair up with someone doing the activity (in their household, or virtually with another student in their class) and trade their sketches. Can their partner determine which characteristics the leaf sketch is depicting?

Remind students to follow Leave No Trace principles while choosing plants to investigate. They should not pick or eat any plants, and be mindful of where they are stepping.

EXTENSION ACTIVITIES

To build out the lesson, have students:

- Write a poem about their plant
- Create leaf rubbings using the flat side of a crayon
- Look for patterns in nature - can they find spirals, fractals, waves, branching, or netting?
- Find an Internet resource or field guide to help them identify what the plant is called
- Lead a discussion about photosynthesis and their plant - where is it located? Is it sunny or in the shade? Is it near other plants?