# HOW PLANTS GET WHAT THEY NEED

## STUDENT WORKBOOK





#### STEP 5

Divide the moistened soil between the five cups. Each cup will be filled about <sup>3</sup>/<sub>4</sub> of the way to the top. There is no correct amount, but try to make each cup's soil amount as even as possible.



#### STEP 6

Add three pea seeds to each cup, spacing them out on top of the soil.

#### STEP 7

Press the seeds under the soil about 1 to 2 inches. Cover the seeds over with soil.

#### STEP 8

Put your cups on a plate or in a plastic bin so any escaped water doesn't make a mess in your house.

#### STEP 9

Set your cups near a window or outside (if it's not snowing or raining). You want to keep your plants between 65-85°F.

#### **STEP IO**

Lightly water your seeds once each day for up to 30 days, or until you are finished with this kit. While excess water will drain through the holes at the bottom of your cups, do not flood the seeds.

#### **STEP II**

After about 7 days, you should see sprouts appearing out of the soil. If more than one seed germinates in each cup (in other words, you see more than one sprout), you will need to reduce the number of plants down to only one in each cup. To do so, wait until the sprouts are at least 1" tall. Then choose the sprout in each cup that looks the healthiest (the tallest and darkest green). Remove the others by carefully pulling them up and out of the soil. When you're finished, place the cups back in the sunlight.



#### STEP I2

Once you have reduced the number of sprouts in each cup to one, place one cup in the bottom of your maze. Shut the flaps closed with tape. Set your maze either near a window or outside, near the other four cups of seeds.

There is an extension activity in Activity 6 that you could use your removed sprouts for. If you choose to do so, make sure you don't throw these sprouts away! Save the bag your peat moss came in for Activity 4.

Jump ahead to Activity 5 before moving on to Activity 2. Activity 5 is a journaling activity related to the plant maze you have created during this activity. You should be working on Activity 5 throughout the other activities within this kit.

# LIFE'S A MAZE

Like any living organism, there are a variety of structures that are required to survive. These are specific to each species, based on the needs of the organism. The types of structures a plant has tells us about where they are found.

In this activity, you will learn about three of these plant structures and the diversity among them. Then, you will test your knowledge with a set of leaves.

#### **LEARNING GOALS:**

I can use evidence to argue that organisms survive when they are suited for their habitats.

### WHAT LEAVES TELL US

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As your plants grow, they will begin to develop several leaves. The leaves are important because the plant needs the leaves to successfully grow through the maze.

Leaves are important for the growth, health, and obtaining resources for plants. Each plant species has its own specially adapted type of leaf to allow it to obtain resources successfully in its **ecosystem.** An ecosystem is a community of both living (ex. plants and animals) and non-living (ex. rocks and weather) things and how those things interact.

Unfortunately, an ecosystem is commonly mis-identified as a habitat. A habitat is where a plant or animal lives, but does not include the interactions that plant or animal has with other living and non-living things. For example, a habitat is the tree a bird's nest is in, while the ecosystem is the forest because within the forest there are other living and non-living things that eat, drink, touch, or interact with each other in different ways.



It is important to understand how a plant's ecosystem impacts the amount of a resource a plant can access. Plants have specialized structures that help them to survive in their ecosystem. These structures include leaves, stems, and roots. There are three main aspects of a plant's leaves that allow it to be successful in its ecosystem: veins, shape, and edges.

#### VEINS

Humans have veins that transport blood throughout the body. A leaf also has veins, but their veins transport sugar and water to other parts of the plant. The dark ridges in the leaf below are the veins, which spread out to provide the sugars and water to the whole plant.

A leaf's veins are important because they transport water and nutrients to the whole leaf, as well as sugars from the leaf to the plant. There are many types of **venation**. Venation is the arrangement of veins in a leaf. The three types of venation are reticulate (which can be separated into pinnate and palmate), dichotomous, and parallel. Each type of venation is important for how the leaf transports its resources.

Reticulate venation is the most common type of venation. You may have seen maple, oak, and elm trees, which have reticulate venation and are found in temperate climates such as most North American forests. When you think of a temperate forest, you most likely think of trees that lose their leaves in the winter.







Both pinnate (pronounced: pi-neit) and palmate (pronounced: pal-meit) venation look like a branching or net pattern. This system allows for more efficient transport of nutrients, water, and sugars to parts of the leaf and plant. However, there are a few differences between pinnate and palmate leaves in how the leaf interacts with its ecosystem. Oak and elm trees have pinnate venation.



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