

A Maze for Plants

Discovering Phototropism

*A lesson from the New Jersey Agricultural Society
Learning Through Gardening Program*

Overview: This experiment will prove to your students that even though plants are stuck in one place in the soil, they can move. Plants will turn and stretch toward the light. This phenomenon known as *phototropism*. Students create a maze for a climbing plant, such as beans or peas. Then they check the maze daily to see if their plant can find its way to the light. This is a great experiment to do when discussing the difference between living and non-living things.

Grades: 3-5, *Younger grades can do this as a whole-class experiment, with the teacher creating the maze as the students watch.*

Objectives: the student will be able to:

- explain that plants move toward the light, and why
- explain how they can prove plants move toward the light
- record the day-to-day results of an experiment

Materials:

shoe boxes, enough for each group of three or four students, or one if you are demonstrating the experiment to the whole class

small plant containers filled with soil, one for each shoe box, about 3-4 inches high. Half-pint milk cartons from the cafeteria will work fine – just be sure to poke some drainage holes in the bottom.

pole bean or pea seeds (Make sure the seed package says 'pole' beans and not 'bush' beans. Pole beans are the ones that grow on a vine.)

Scraps of light cardboard (like that used for posters)

Dark tape such as duct tape or masking tape

Transparent tape

Rulers

Optional: science journals

Preparation

Before starting the activity, use a sharp knife to cut a rectangular hole in one small end of each shoe box. *See picture.*

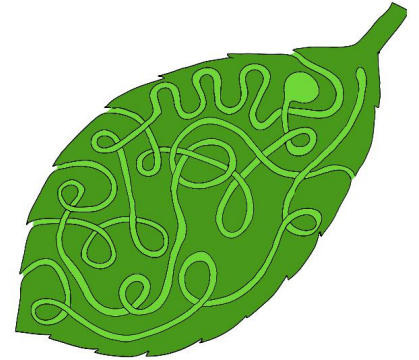
To make creating the maze easier for students, it is a good idea to put together a model shoe box maze according to the instructions below, so that students can visualize their instructions.



Introduction

Begin the discussion by asking students how they know something is alive. Encourage answers such as grow, breathe, reproduce, move, eat or require nourishment. Next ask how we know that plants are alive. Ask the students what plants need to live. Ask if plants move. Ask if they have ever seen a plant move. Ask why they think a plant would move. Discuss their answers.

Next tell students that they are going to do an experiment to prove that plants will move toward the light. Ask students if they know what a maze is and if they have ever seen one, (Answers may include a corn maze, a hedge maze, or a puzzle maze drawn on paper.) Now tell students they are going to create a maze that a plant will have to solve in order to reach the light.



Procedure

Divide students into groups of three or four to make the mazes and give each group a prepared shoe box. Ask the students hold the boxes up to the light. If there are any spaces where light shines through, have students tape over the spaces with the dark tape.

Making the maze:

Distribute the cardboard, rulers, and transparent tape. Give the students the following instructions or write them on the board:

Measure two pieces of cardboard into rectangles so that:
Two parallel sides are half the width of the shoe box
The other two parallel sides are the same height of the shoe box.
Measure the length of the shoe box and divide by three.

Make a mark at the points at one-third and two-thirds of the box.

Tape one cut cardboard piece on the left side of the box at the one-third mark, lining up the side equal to the height of the box.

Tape the other cardboard piece on the right side of the box at the two-thirds mark.

Plant two or three bean or pea seeds in the small plant container one-inch deep. Water the pot and press the soil down gently.

Stand the open shoe box on the small end that does not have the cut whole. Place the small pot gently on its side underneath the first piece of cardboard. Gently place the lid on the box while it is still standing on the uncut small end. The cut end should be facing up. Place the shoe box on a sunny windowsill.

Ask students to check the inside of the box daily and record their observations in their science journals. When checking the box, they should remove the lid very carefully. Remind students that they must check the soil for moisture and stand the pot up and water it whenever the soil is dry. The plant will not grow without water.

Over the next two or three weeks, allow the students to regularly observe the plant as it twists and turns toward the light inside the maze. Students can write their observations in their science journals. When the plants have reached the top of the maze, gather the class and discuss the results of the experiment.

Evaluation:

Students write a paragraph or paragraphs (depending on their grade level) explaining what they hoped to prove with the experiment, what they observed during the experiment, and what the conclusion was.

Students complete their observations of the experiment in their journals.

Extension:

Have students research other other plant tropisms, such as gravitropism or hydrotropism.

Do the *Learning Through Gardening* experiment on gravitropism entitled: "What's Up? Discovering Gravitropism." Find the lesson on our website: www.njagsociety.org,