

HOW'S IT GROWIN'?



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TEACHER GUIDE



PLANNING

Here's a suggested schedule for this kit! The activities should be completed in order, but you can choose when the lessons take place over time.

ACTIVITY INFORMATION	SECTION(S)	TIME	DAY/LESSON
ACTIVITY 1: LIFE'S A MAZE Total time: 1 h	<input type="checkbox"/> Plant Maze <input type="checkbox"/> Create Your Maze <input type="checkbox"/> Starting Plants	60 minutes	Day 1
ACTIVITY 5: WATCH AND WAIT Journal as you learn about the effort plants make to survive. Total time: 2 h	<input type="checkbox"/> Journaling: Day 1	15 minutes	Day 2
ACTIVITY 2: STRUCTURES FOR SURVIVAL Learn about the structures have to survive! Total time: 1 h 30 min	<input type="checkbox"/> What Leaves Tell Us	45 minutes	Day 3
ACTIVITY 5: WATCH AND WAIT (CONTINUED)	<input type="checkbox"/> Journaling: Day 2		Day 4
ACTIVITY 2: PUTTING ON MY BEST SUIT (CONTINUED)	<input type="checkbox"/>		
ACTIVITY 5: WATCH AND WAIT (CONTINUED)			
ACTIVITY 3: WHAT DO I NEED TO SURVIVE?			

Full schedule
available with
purchase

NOTE: Please note that this activity schedule is different from others within Science Unlocked because Activity 5 is suggested to be completed throughout the time your student is working on the whole kit, rather than in a part by itself. During Activity 5, your student will be journaling about the plant they begin growing in the plant maze in Activity 1. Because plants grow slowly, the journaling alongside the growth will take at least 3 weeks to accomplish effectively. Additionally, as they journal, your student will be collecting experimental data they later use to create graphs and answer questions. Therefore, it is important that their journaling isn't rushed to done in a single week as they won't obtain accurate results to graph and effectively answer questions with. While this may change the way you structure their learning, it is most beneficial that students have at least three weeks to complete this activity slowly. Do remember that this schedule is optional and that you can perform the activities within the kit at your student's speed, as you dive into their science learning.

1

LIFE'S A MAZE

In this activity, your student will observe unusual plant growth through a maze, which enables a plant to obtain one of its most needed resources – light. Then, your student will set up their own plant maze and start five plants they will use throughout this kit.

activity

PLANT MAZE

? **Question 1: What are two things you observed in this photo?**

Answer: There is no wrong answer here. However, your student should notice that the plant is weaving through the maze, even though it is stuck in one place by its roots growing in the soil of the cup.

How to Help: You can encourage your student to notice this by mentioning that the plant has not grown beyond the constraints of the cup. They should also have noticed that the plant is growing upwards through the maze, rather than out the side of it. You can encourage your student to notice this by prompting them with, "What direction is the plant growing?"

? **Question 2: What are two questions you have about this photo?**

Answer: There is no wrong answer here. Your student may question how the plant can grow through a maze when a plant's stem typically grows in a straight line.

How to Help: You can encourage your student to think of this by asking them, "In what direction does a stem typically grow?" or "What direction does a stem grow in?" Students who know that many plants are green may also question why the plant is green when it doesn't have direct sunlight due to the structure of the maze. You can encourage them to notice this by pointing out the color of the plant growing in the maze. Avoid thinking of the questions for your student, but instead encourage them to think of the questions on their own.

2

CREATE YOUR MAZE

MULTIPLE AGES AND ABILITIES:

If you have an older student, you can allow them to use a scalpel or other sharp blade rather than scissors to cut the holes in their box. For students who are younger, you can have them draw the holes and then cut the holes for them. In the case of multiple students, each one can create a hole, or one student can draw the holes that the other cuts out.

Additionally, all students may want to help in decorating the maze. Encourage each student to take a side of the maze to decorate, or have one student create a design that the other student creates on the maze. If you have additional boxes around, you can also have each student create their own maze. If you choose to do this, make sure you have additional cups or small pots around as well. Also, make sure that you are cautious with the seeds and ensure there are enough for each student to grow 5 plants.

CONTENT

- If you have a student that is excited about plants or has previous knowledge on plant parts, you can challenge them by delving deeper into the types of stems and roots. While woody and herbaceous stems are the main two categories, your student can look at the variety of stems found within each category to understand them better.
- The same is true for roots. Taproots and fibrous roots are the two main types of roots found in plants.
- There are adventitious roots, aerial roots, and prop roots.
 - Adventitious roots form from non-root tissues. They can occur because of environmental stressors, but are also common in strawberries.
 - Aerial roots grow above the soil level and can assist the plant in climbing or anchoring to walls and trellises.
 - Prop roots, like those seen on mangroves, grow out from the stem at many places.



SHOW WHAT YOU KNOW

Question 1: Does a cactus have leaves? Explain.

Answer: A cactus does have leaves, but they are highly specialized spines. Looking at the leaf characteristics your student learned about, they should be able to say that it has parallel venation, is needle-shaped, and smooth edges. Spines and needles on a pine tree are similar in their adaptations, even though they are found in different ecosystems. A cactus is found in the desert, while a pine tree is found in a coniferous forest.

Question 2: Could a plant have both needles and dichotomous venation? If so, give an example.

Answer: Dichotomous venation can be found in almost any ecosystem, while needles are found in an ecosystem that has reduced water resources. While it is possible for a plant to have both needles and dichotomous venation, it does not currently exist in nature. Additionally, plants with needle-shaped leaves typically have parallel venation.

Question 3: Could a plant have both a woody stem and a fibrous root system? If so, give an example.

Answer: Yes! It is very common for a plant to have both a woody stem and a fibrous root system. Most trees have both woody stems and fibrous root systems. Large trees need a woody stem to hold it up as it grows and becomes heavy. Similarly, a fibrous root system keeps the tree from falling over during wind storms or animals rubbing up against it.

Question 4: Give an example of a plant that has a fibrous root system and has leaves that are hand shaped, with lobed edges and reticulate venation. What type of stem does it have? Hint: Use your leaves to get you started.

Answer : An oak tree has all of those traits and a woody stem. The third leaf in "Organize to Understand" is an oak leaf.



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