mystery science

# Anchor Layer Teacher Guide

A curriculum companion for Anchor Layer users

## Grade 1

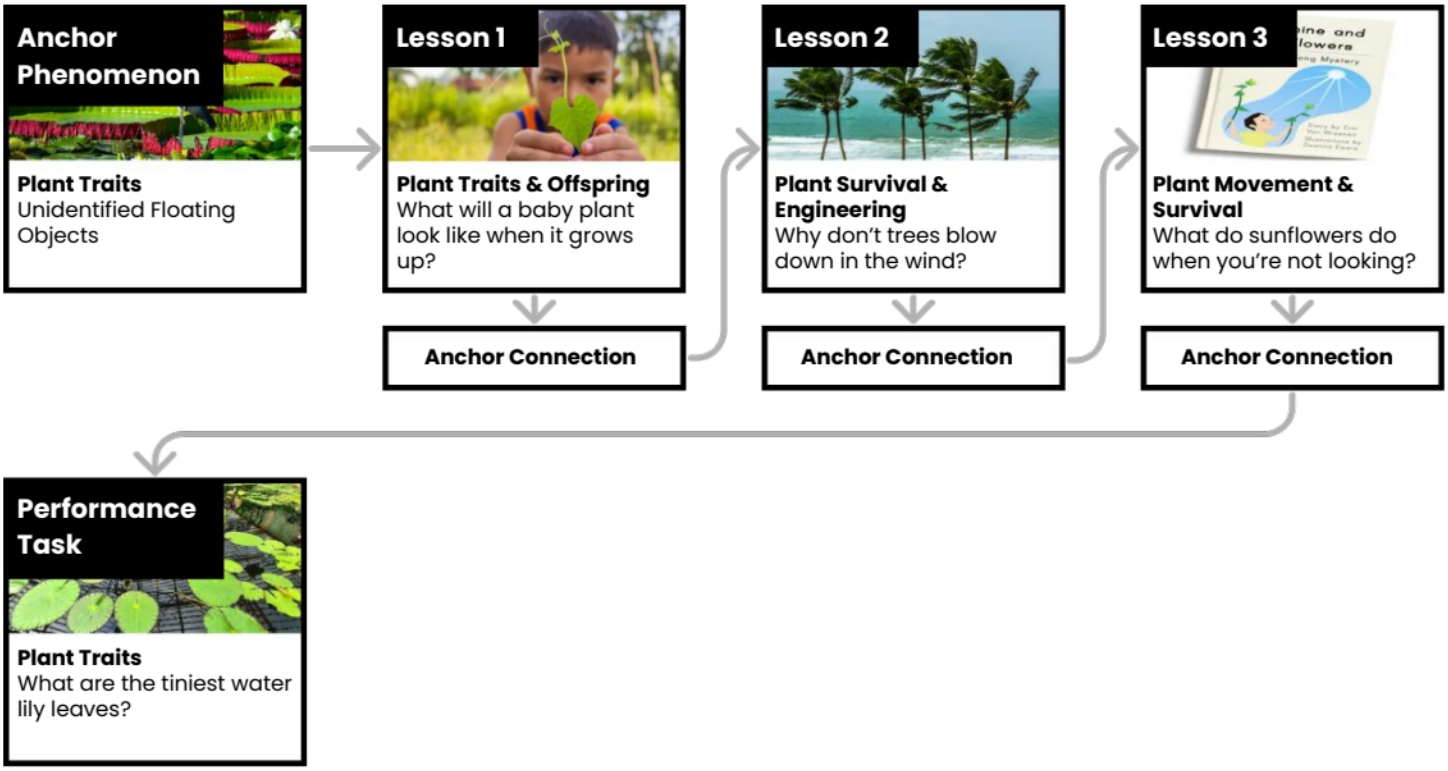
# Plant Traits & Survival

Unit Web Link • Pacing Guide • Other Units

## Unit Summary

In this unit, students explore the different parts of plants and how those parts are essential for plant survival.

| Performance Expectations | Science & Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
|---|---|---|---|
| • 1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.<br>• 1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.<br>• K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>• K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>• K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. | • Constructing Explanations and Designing Solutions<br>• Developing and Using Models<br>• Planning and Carrying Out Investigations<br>• Analyzing and Interpreting Data<br>• Obtaining, Evaluating, and Communicating Information<br>• Engaging in Argument from Evidence | • LS3.A: Inheritance of Traits<br>• LS3.B: Variation of Traits<br>• LS1.A: Structure and Function<br>• LS1.B: Growth and Development of Organisms | • Structure and function<br>• Patterns |



## Anchor Phenomenon Background

How do these things float, and where did they come from?

Plants grow leaves in a huge range of shapes and sizes, including some plants that don't grow any leaves at all. Some plants grow a huge number of tiny leaves, while others grow a tiny number of huge leaves.

Giant water lilies are a type of plant that grows some of the largest leaves of any plant on Earth. The plant in the image above only has 11 leaves, but each leaf is enormous. The leaves grow in a very unique shape, with a wide, very flat bottom, and a vertical wall that runs around the circumference of the leaf. This helps them to remain floating on top of the water that they grow in. The underside of the leaf has very strong, large veins that support the leaf and help maintain its shape.

These plants grow best in bodies of water that receive lots of sunlight. The huge leaves help the plant to collect as much sunlight as possible, while also blocking sunlight from reaching other plants that might also try and grow near them. This helps ensure that the giant water lilies get the resources that they need.

The unique size, shape, and structure of these leaves has inspired engineers and scientists to design many different types of structures. It is an ongoing area of research to better understand how these incredible plants are able to grow such incredible leaves.

## Anchor Phenomenon: Unidentified Floating Objects
Plant Traits

**Anchor Phenomenon**
15 mins

**Guided Inquiry**
15 mins

### Anchor Phenomenon Overview

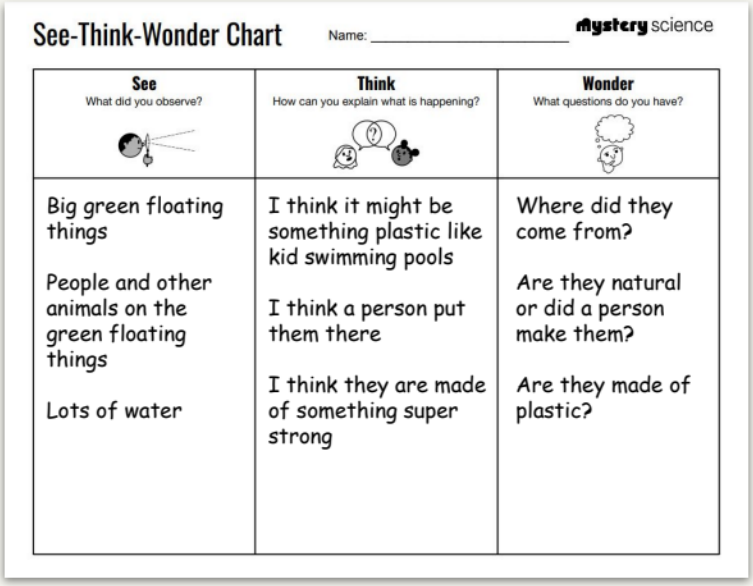
Note: This lesson is part of this unit's Anchor Layer. If you have the Anchor Layer turned on, we recommend teaching all of the lessons in this unit in order.

The anchor phenomenon for this unit is based around some surprisingly large floating objects that can be found in ponds around the world.

During the introduction, students generate observations and questions about the phenomenon and create a list of possible explanations for the phenomenon. Students will use these initial ideas to track how their understanding grows throughout the unit.

### Student Work Samples & Notes

Students will gather clues during and after each lesson in this unit to help them improve their understanding and explanations. It is important to encourage students to recognize that even if they don't know the perfect answer yet, they are going to learn a lot throughout the unit and will have an opportunity to revisit the phenomenon over time.



See-Think-Wonder Chart

Name: _____

| See<br>What did you observe? | Think<br>How can you explain what is happening? | Wonder<br>What questions do you have? |
|---|---|---|
| Big green floating things<br><br>People and other animals on the green floating things<br><br>Lots of water | I think it might be something plastic like kid swimming pools<br><br>I think a person put them there<br><br>I think they are made of something super strong | Where did they come from?<br><br>Are they natural or did a person make them?<br><br>Are they made of plastic? |

## Lesson 1: What will a baby plant look like when it grows up?
Plant Traits & Offspring

**Exploration**
10 mins

**Hands-On Activity**
30 mins

**Wrap-Up**
5 mins

**Anchor Connection**
15 mins

**Assessment**
20 mins

### Overview
In this lesson, students identify the pattern that young plants are similar to their parent plants.

In the activity, Mixed-up Plants, students observe three seedlings and three adult plants and use their observations to match each seedling to its adult counterpart.

**Activity Notes**
We suggest students work in pairs so that they can discuss their ideas.

### Anchor Connection
In this lesson, students gathered observations of the characteristics of plant leaves. Those characteristics can be used to identify leaves that grow in completely different shapes and sizes than more common leaves do. At first glance, giant water lily leaves don't look like leaves, but they have many of the same characteristics of more common leaves.

Students revisit the See-Think-Wonder chart that they worked on during the Anchor Phenomenon. They should understand that if we look closely at the unidentified floating objects, we see that they have many characteristics in common with the leaves of other plants. This is because the giant floating objects are leaves!

### Connecting Storyline Question
What does the bottom of a giant lily leaf look like?

## **Lesson 2: Why don't trees blow down in the wind?** (pg 1 of 2)
Plant Survival & Engineering

**Exploration**
18 mins

**Hands-On Activity**
40 mins

**Wrap-Up**
2 mins

**Anchor Connection**
15 mins

**Assessment**
20 mins

### Overview

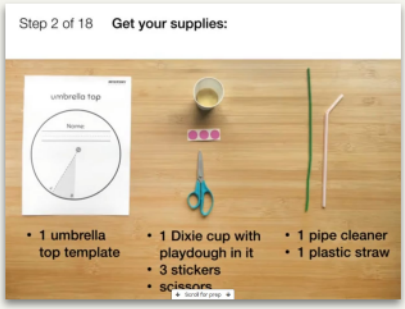
In this lesson, students examine structures like roots, branches, and leaves that keep trees from blowing down.

In the activity, Wind-Proof Umbrella, they use their observations to create their own tree-inspired umbrellas that stay up in the wind.

### Activity Notes

Each student will create their own wind-proof umbrella, but will need a partner to help with a few steps.

You may choose to purchase or make your own playdough for this activity. We recommend preparing the wind test station before the class begins. See the lesson page for more detailed prep instructions.



***Anchor Connection on Next Page***

## **Lesson 2: Why don't trees blow down in the wind?** (pg 2 of 2)
Plant Survival & Engineering

**Exploration**
18 mins

**Hands-On Activity**
40 mins

**Wrap-Up**
2 mins

**Anchor Connection**
15 mins

**Assessment**
20 mins

### Anchor Connection

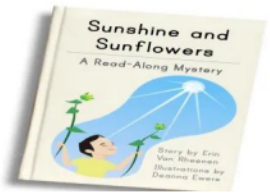
In this lesson, students gathered observations of trees in order to design and construct improved umbrellas. The natural world is a source of inspiration for many designs. Giant water lily leaves have characteristics that are similar to the design of umbrellas, and they have served as inspiration for architecture.

Students revisit the See-Think-Wonder chart that they worked on during the Anchor Phenomenon. They should understand that the giant lily leaves are able to support themselves, in part, due to a strong set of veins that act like the ribs of an umbrella.

### Connecting Storyline Question

Where do giant lilies grow best?

## Lesson 3: What do sunflowers do when you're not looking?
Plant Movement & Survival




**Exploration**
25 mins

**Hands-On Activity**
15 mins

**Anchor Connection**
10 mins

**Assessment**
20 mins

### Overview
In this Read-Along lesson, Jin plants some sunflowers in a sunny spot & some in a shady spot, watches to see which grow best, & then figures out why.

The lesson includes a short exercise where students stand up and pretend to be sunflowers, turning their faces to the sun as young sunflowers do. You can extend the lesson with the optional activity, Plants on the Move, where students observe plants respond to light by bending toward the light source.

### Activity Notes
As an optional activity, we suggest having students observe and discuss how plants respond to light.

If you like, you can grow your own experimental plant by planting bean, sunflower, or corn seeds a week before you experiment. Buying a bean seedling or an herb such as thyme will also work.

### Anchor Connection
In this lesson, students gathered observations of plants grown in full sun and in the shade. Plants grow best when they receive the correct amount of sunlight. Some plants prefer lots of direct sunlight, and giant water lilies are one of those plants.

Students revisit the See-Think-Wonder chart that they worked on during the Anchor Phenomenon. They should understand that the giant lily leaves gather lots and lots of sunlight. These plants live in bright locations around the world.

### Connecting Storyline Question
What are the tiniest water lilies?

## Performance Task: What are the tiniest water lily leaves?
Plant Traits

**Unit Review**
15 mins

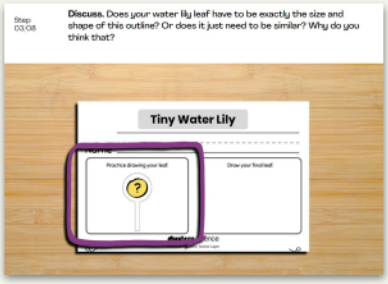
**Hands-On Activity**
30 mins

### Overview

In this performance task, students will gather observations of a new species of water lily plant. This species is the opposite of the giant water lily plants students have seen all unit: it grows the tiniest water lily leaves in the world.

After a review of the unit, students will compare and contrast the tiny water lily plants with the giant water lily plants. They will use their observations to predict what a new tiny water lily plant might look like.

The scientific name for the tiny water lilies is Nymphaea thermarum. More information on them can be found here.




### Performance Task Notes

Students can work individually or in pairs. Each page of the Tiny Water Lily worksheet file has two copies of the worksheet itself. Once you have printed the worksheets, cut them in half before handing them out to students.

### Crosscutting Concepts

*Patterns*: Among all living things, certain traits are passed from parent to offspring. Offspring look similar, but not identical, to their parents. This pattern is seen again and again among living things, and is an important building block toward understanding genetics and heredity in later grades

*Structure & Function*: Other patterns can be seen when looking at the structure and function of various parts of living things. For example, leaves exist in a wide variety of shapes and sizes, but when those leaves are compared with one another across living things, we find that they have similar structures with similar functions