

Plant Structure & Function: ThingLink

4th Grade

NGSS: [4-LS1-1](#)



Read Pre-Lesson Preparation Before Class

Lesson Description

Plants are the most successful living things on Earth. They have survived hundreds of millions of years despite five mass extinctions and continue to thrive. In this lesson students will learn about the structures plants need to survive through station investigation. Once they have completed the activity, students will apply what they've learned by modeling how a fern is able to survive without seeds.

Driving Phenomenon

Millions of years before flowering plants evolved on Earth, ferns and other plants covered the landscape. Not all plants grow from seeds and seeds didn't evolve until millions of years after ferns and similar plants. Ferns grow from spores instead of seeds but are still one of the most, if not the most, successful plants on the planet.

Driving Questions

- What parts does a plant need to survive?
- How do plants adapt to live in different places?

Learning Objectives

- Students use models to gain an understanding of basic plant anatomy.
- Students will apply knowledge of seed plants to learn about how spore plants survive.

Time Requirements

- 2 hours 20 minutes

Prerequisite Knowledge

- Introduction to structure and function.
- Not all parts of the Earth's crust formed at the same time.

Teacher Resources

1. [Fern Image](#)
2. [ThingLink Digital Herbarium Activity](#)
3. [Seeds Video](#)
4. [Article: Florida fern fans fight to save plants that are in danger of disappearing](#)

Student Resources

1. [Station Rotation Graphic Organizer](#)
2. [Seed Plant and Fern Models](#)
3. [Fern Research handout](#)
4. [Claim- Evidence-Reasoning](#)

Acknowledgements

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How can we know about Earth's past before humans existed?

Full lesson procedures begin on the next page

Engage 20 minutes	
Students will make observations of an image of plant spores and make predictions of what this plant needs to survive.	Notes
Teacher Resources: 1.0	
Explore 30 minutes	
Once students have predicted what the fern needs to survive, they will learn about seed plants through a digital ThingLink activity. Students will create a model of a seed plant while completing the activity.	Notes
Teacher Resources: 2.0 Student Resources: 1.0	
Explain 20 minutes	
After students have completed their model of a seed plant, they will complete a prediction model of the fern with labels and explanations.	Notes
Student Resources: 2.0 , 2.1	
Elaborate 25 minutes	
Students research how fern plants reproduce without seeds.	Notes
Teacher Resources: 2.0 , 3.0 , 4.0 Student Resources: 3.0	
Evaluate 40 minutes	
Students evaluate their research by creating a claim-evidence-reasoning argument for how ferns reproduce without seeds.	Notes
Student Resources: 4.0	

How do ferns survive without seeds?

Materials

NOTES

- Projector or Smartboard for showing students images
- Computers, Chromebooks, or tablets for student research and investigation
- White board or chart paper for recording student responses
- Examples of live plants, if possible: real leaves and pine sprigs from neighboring trees, air plants, moss, or ferns.

Lesson Enrichment Ideas

READ

The Magic School Bus Plants Seeds

by John Speirs and Joanna Cole

A book about how living things grow. <http://www.worldcat.org/oclc/933301673>

I Wonder Why Trees have Leaves

by Andy Charman

Colorful illustrations help the reader learn many facts about plants, such as why fruits are sweet, which plant has a private pool, and how certain plants attract insects.

<http://www.worldcat.org/oclc/52738417>

WATCH

Seeds

This video provides a background of how seed plants evolved.

<https://vimeo.com/203210139>

How do ferns survive without seeds?

Engage

- 1 Project the image of the fern ([Teacher Resource 1.0](#)) to the class.
- 2 Gather observations from students. What do they notice? What does the plant need to survive? How do the parts of the plant help it survive?
- 3 Ask students to share their observations and record them on chart paper or the board.

Explore

- 1 Distribute [Student Resource 1.0](#) and instruct students to go to the ThingLink activity page ([Teacher Resource 2.0](#)). Review how students will collect data and observations. If using live plants, have students move around the room in order to observe these specimens while working on the sections that pertain to them.
- 2 Before students begin, instruct them on how to navigate through the ThingLink. Students can click on flashing icons in any order and can navigate away from the icons by closing out the popups that come up. Students can return to the main page of the ThingLink at any time by clicking on the Home icon in the upper left corner of the screen. As students complete the stations, they should record their observations in the table of [Student Resource 1.0](#).
- 3 If students finish early, they can make sure each plant section of their handout is complete, and they have written what each part does.

Explain

- 1 Once students have completed [Student Resource 1.0](#), have them complete two full models ([Student Resource 2.0](#) and [2.1](#)). For the first model, they should draw and label each portion of a standard flowering plant, show how water moves through the plant, and how sunlight moves through the plant. Students may use words, arrows, drawings, or other symbols to show their knowledge.

How do ferns survive without seeds?

Explain

- 2 For their second model, project [Teacher Resource 1.0](#) again. Explain to students that the plant they have been observing is called a fern. Ferns survive without seeds.
- 3 Next, direct students to create their second model. In the second model, students should draw a fern, and label each of the same components. Students will need to make an educated guess on how ferns reproduce since they don't have flowers or seeds.

Elaborate

- 1 Have students share out their prediction models in small groups. Ask for students to volunteer their educated guesses on how ferns survive without seeds.
- 2 Once students have shared their thoughts, let them know they will be researching how ferns reproduce without seeds. Direct students to the information gathering handout in the student resources ([Student Resource 3.0](#)). Review your protocol for using technology to research answers, if appropriate. Suggested resources for research can be found in the Suggested Resources section (see right).

Evaluate

- 1 Allow students to revise their model based on what they've learned in their research. Students should focus on spores and where spores exist on the plant.
- 2 Have students use Claim-Evidence-Reasoning to explain their model ([Student Resources 4.0](#)).
- 3 After students have completed their CER, share information about ferns and details about their life cycle and how they reproduce at [Unfolding of Microplant Mysteries](#) (scroll down to the ferns section for this information).

SUGGESTED RESOURCES

Seeds

This video provides a background of how seed plants evolved.

<https://vimeo.com/203210139>

Florida fern fans fight to save plants that are in danger of disappearing

Newsela article about ferns and spores.

<https://newsela.com/read/fern-crisis/id/10754/Plant>

Fern Plant

Teacher Resource 1.0

Fern Close Up



kaibara87 [CC BY 2.0 (<https://creativecommons.org/licenses/by/2.0>)]

Full Fern Plant



Lotus Johnson [CC BY 2.0 (<https://creativecommons.org/licenses/by/2.0>)]

Plant Structure and Function Activity

Teacher Resource 2.0

ThingLink Digital Herbarium Activity

Direct students to use the link below to access the ThingLink activity site for the digital version of this lesson. ThingLink is a website that creates virtual tours and learning modules that are interactive and engaging. They will need a digital or printed version of [Student Resource 1.0](#) to complete during this activity.

ThingLink tour: <https://www.thinglink.com/card/1748750719676056229>

Plant Structure and Function Activity Worksheet



Student Resource 1.0

Plant Structure Name	Structure What does the plant part look like?	Function What does the plant part do?
Leaf		
Stem		
Flower		
Root		

Student Resources

Name:

Date:



Student Resource 2.0: Plant Models

Flowering Plant Model

Student Resources

Model Checklist

Labels

- Flower
- Stem
- Xylem
- Phloem
- Roots
- Leaves

Arrows

- Sunlight moves
- Water moves

Student Resource 2.1: Plant Models

Fern Model

Model Checklist

<u>Labels</u>	<u>Arrows</u>
<input type="checkbox"/> Stem	<input type="checkbox"/> Sunlight moves
<input type="checkbox"/> Xylem	<input type="checkbox"/> Water moves
<input type="checkbox"/> Phloem	
<input type="checkbox"/> Roots	
<input type="checkbox"/> Leaves	
<input type="checkbox"/> Part for reproduction	

Fern Research

Name:

Date:

Student Resource 3.0

Student Resources

Research Prompt: How do ferns survive without seeds?		
<p>Source 1:</p> <p>Site _____</p> <p>Author _____</p> <p>Date Published _____</p>	<p>Fact(s)</p>	<p>How does this fact help answer the prompt?:</p>
<p>Source 2:</p> <p>Site _____</p> <p>Author _____</p> <p>Date Published _____</p>	<p>Fact(s)</p>	<p>How does this fact help answer the prompt?:</p>
<p>Source 3:</p> <p>Site _____</p> <p>Author _____</p> <p>Date Published _____</p>	<p>Fact(s)</p>	<p>How does this fact help answer the prompt?:</p>

Claim-Evidence-Reasoning

Name:

Date:

Student Resource 4.0

Student Resources

CLAIM - EVIDENCE- REASONING

TOPIC: What question are you trying to answer?

CLAIM: What is your answer to the question?

EVIDENCE: What facts have you learned that support your CLAIM?

Fact 1	Fact 2

REASONING: How does your EVIDENCE support your CLAIM?