

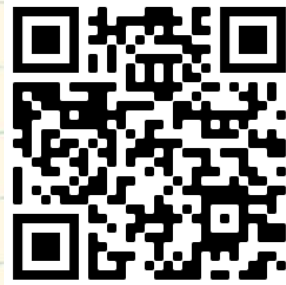
WE NEED YOUR HELP!



We are glad to provide these materials for free. In order for us to continue receiving funding for new materials, we need to collect information on how they are used.

Thank you for taking the time to answer the following one-minute survey.

There are three ways to complete the survey:



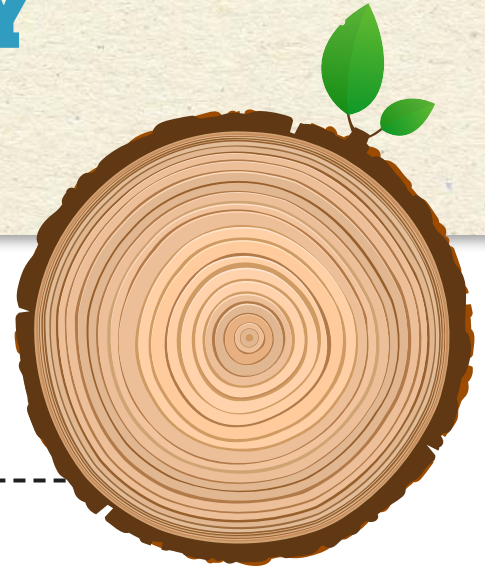
- 1** Scan this code with your smartphone camera
- 2** Type the following link into your web browser:
<https://plantheroes.org/educator-survey>
- 3** Email your answers to:
plantheroes@publicgardens.org



- 1) Job title
- 2) Name of organization you belong to
- 3) What kind of educator are you?
 - Teacher
 - Summer camp counselor
 - Home schooler
 - Public garden educator
 - Informal educator
 - Other (please describe)
- 4) What grade level do you teach?
 - Elementary (K-5)
 - Middle School (6-8)
 - High School (9-12)
 - Other (please describe)
- 5) Specify what subject area you teach:
 - Science
 - Math
 - Language Arts
 - Social Studies
 - Other (please describe)
- 6) How many students do you teach in a school year?



THE STORY OF A TREE



THEME

- Forest Health
- Ecology
- Plant Conservation

TYPE OF LESSON

- Instructor-Led
- Hands-On
- Garden Exploration

POSSIBLE WAYS TO LEAD LESSON

- Outdoors
- Virtual
- Classroom
- Other:

TEACHING STRATEGY

- Place-Based Learning
- Storytelling
- Nature Play
- Art / Movement
- Other: Collaboration in small groups

STANDARDS

- NGSS, LS3.B: Variation of Traits. The environment also affects the traits that an organism develops.
- NGSS, LS1.A: Structure and Function. Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.
- CCSS.ELA-LITERACY.W.3.3, 4.3: Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

GRADES 3–4

DURATION 60 minutes

LESSON GOAL

Learners will practice observing and analyzing a tree and its parts, strengthening their ability to identify factors that can affect its form and growth. Through storytelling, they will practice cultivating empathy for a tree as they consider its life and the challenges it faces as a living organism.

LESSON SUMMARY

In small groups, learners create a model of a tree trunk using bark rubbings and drawings of tree rings to show how the tree grew over time. They gather observations and, from those, come up with ideas about obstacles the tree might have faced. Then they write a story about how the tree changed over time. During a group share, they use storytelling to explain their ideas.



WORD BANK

adaptation
annual
bark
dendrochronology
external structures
growing season
internal structures
tree rings



PRINTED MATERIALS

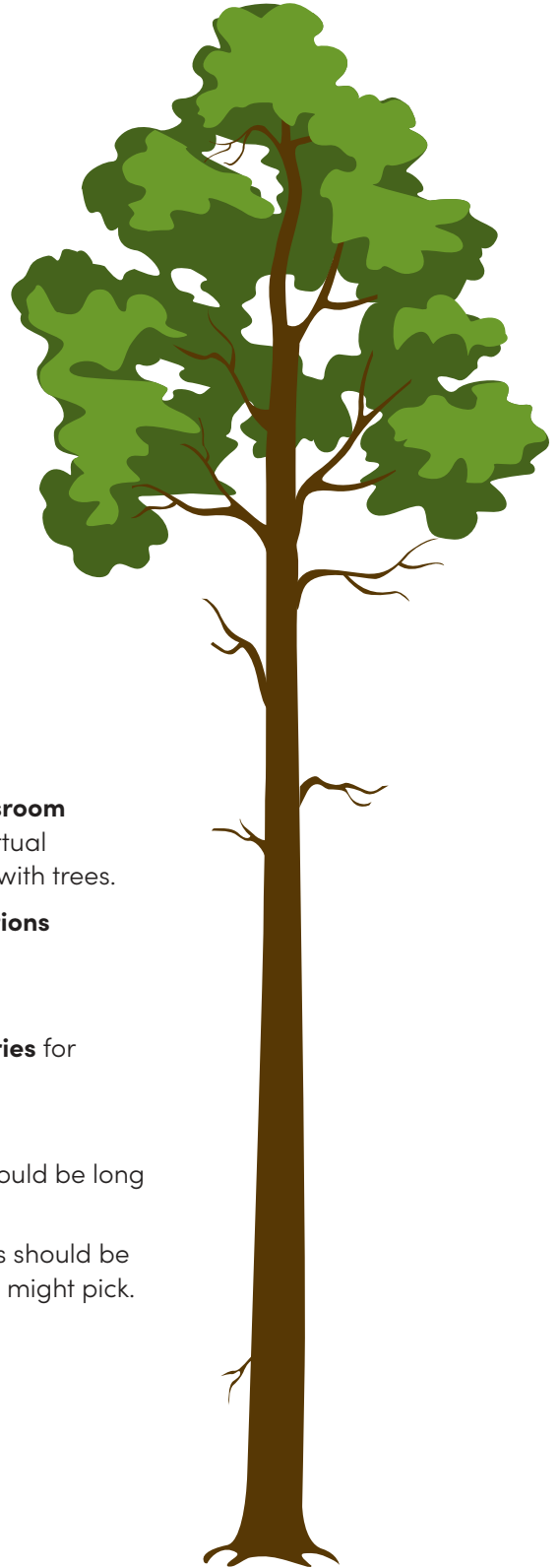
- **Story of a Tree** worksheet (1 per group)
 - **Tree Ring Images** (1 set per group)
 - **Example Tree Stories** (1 set per group)
-

OTHER MATERIALS

- A roll of kraft or butcher paper (18 inches tall, suggested)
 - Masking tape (1 roll per group)
 - Crayons (bark colors; several per group)
 - Scissors (1 pair per group and per teacher)
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SETUP

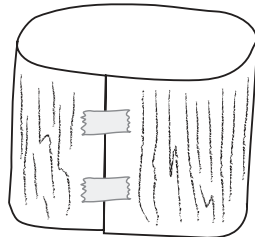
1. Review the **lesson procedure**.
2. Decide whether you will conduct an **outdoor exploration**, a **classroom exploration**, or a **virtual exploration**. Consider a classroom or virtual exploration if you are unable to take learners outside to an area with trees.
3. Review and consider the optional **pre-** and **post-lesson explorations** and the **extensions**.
4. Prepare the lesson **materials**.
 - a. Print out one set of **Tree Ring Images** and **Example Tree Stories** for each group.
 - b. Print out one **The Story of a Tree worksheet** for each group.
 - c. Cut kraft paper for the trunks (one for each group). Pieces should be long enough to wrap around nearby trees.
 - d. Cut kraft paper for the tree rings (one for each group). Pieces should be large enough to trace the circumference of any tree learners might pick.
 - e. Peel paper off crayons.
5. Arrange tables or a sitting area for each group.



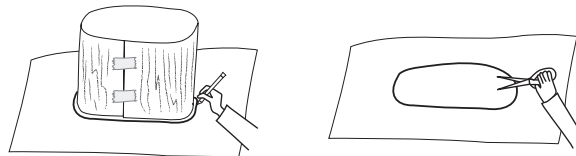
LESSON PROCEDURE

- Optional: Complete one or more of the **pre-lesson explorations**.
- Share **lesson opener** about tree rings.
- For outdoor explorations:** Review safety guidelines. Go outside to an area with one or more trees. Continue with the steps below.
For classroom or virtual explorations: See the **adaptations** section.
- You may assign roles to learners, such as tree selectors and paper placers, bark examiners, and rubbing artists.
- Have each group tightly wrap kraft paper around their chosen tree trunk and tape it in place. The paper ends should overlap.
- Have learners make a rubbing of the tree bark with the side of the crayons, covering the whole paper, taking care to emphasize unique areas in the bark.
- Learners should study the tree for clues about how it grew over time. They will later use these details to come up with a story about the life of the tree.
- Educators should rotate among groups, offering help and asking questions to guide their observations (e.g., “What do you notice?” “How is this different?”). Look for opportunities to discuss the **lesson questions**.
- Learners remove the completed rubbing from the tree and return to their workspace.

- Have learners tape their paper back together so that the paper creates a cylinder in the shape of a tree trunk.

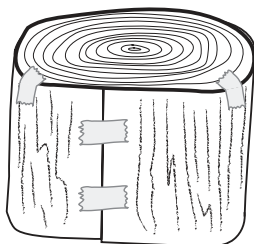


- Help learners trace around the base of the cylinder onto another piece of paper and cut out the disc.



- Have learners draw tree rings on the disc, starting at the center. Explain that each ring tells a story about a year in the tree's life. Since they can't look inside the tree, they should use imagination and their observations of the outside of the tree to decide how the rings will look.

- Help learners tape the disc to the top of their paper cylinder to create a tree trunk.



- Using the **worksheet**, have each group write a brief story about the life of their tree with the information from the bark and the tree rings they imagined.
- Come together as a class, and allow each group to share the story of their tree.
- Educators can encourage improvisation to increase learner engagement (see **example tree stories** for ideas).
- Optional: Complete one or more of the **post-lesson explorations**.

LESSON OPENER

Share the following with learners to orient them to the topic:

- A tree can tell you a lot without saying a word. You can read part of its story from its strong, protective bark, which acts like skin to keep bugs and birds out. There is much to discover simply by observing.
- But some things you can't observe from the outside. The inside of the tree tells another part of its story. Tree rings are natural markings inside a tree that you can see after the tree falls over or is cut down.
- The study of the rings and tree growth over time is called *dendrochronology*. This uses tree rings to help determine the age of a tree and the environmental factors that affected the tree while it grew.
- **ASK:** *What do you think might affect how a tree grows?*
- These rings are also called *annual growth rings*. They can tell you a lot about the tree, such as how old it is, the climate conditions during a certain period of its life, and whether anything harmed the tree, such as a fire or even an insect burrowing into the wood.
- Trees usually grow in spring and summer. This is called their *growing season*. Each year during the early part of the growing season, the tree adds new wood all the way around the trunk beneath the bark. When the tree is growing quickly, this makes a lighter-colored ring because the wood is not very dense. When growth slows down as the growing season ends, the tree makes a darker ring out of denser wood. The tree usually adds a light ring and a dark ring every year. The oldest rings are in the middle, and the youngest are on the outside.
- If the rings slowly become thinner over the years, this could indicate, for example, a change in climate or that the tree is being shaded out by other trees.
- The newest layers of the tree help transport nutrients and water up from the roots and transport sugars down from the leaves.
- The inner rings dry up and become hard, helping the tree stand tall and strong.
- **PROMPT:** Have learners try to identify what variations in the rings could mean. Then, provide the following information before moving on:
 - Wide rings mean that the tree had access to lots of water and nutrients (or that the tree was young).
 - Thin rings may mean there was a drought (or that the tree was old).
 - Fires can cause scars.
 - Invasions from pests can also leave holes and other marks.



LESSON QUESTIONS

- How old do you think your tree is?
- What stories can the tree rings tell us about the tree and its survival?
- What challenges might your tree have faced in growing tall and strong?
- What adaptations do you wish you could give your tree to help it to survive?
- What evidence did you find in the bark of your tree to indicate that the bark is a protective layer?
- What is the story of YOUR tree, and what details did you notice to inspire your story?

PRE-LESSON EXPLORATIONS

Have learners complete any of these prompts:

- Learners can walk around their schoolyard and pick a tree to sketch. On the same page, they can make notes about how they think that tree has grown to look like it does today.
- To assess prior knowledge, have learners sketch what they think the inside of a tree looks like. Emphasize that it is acceptable to guess.

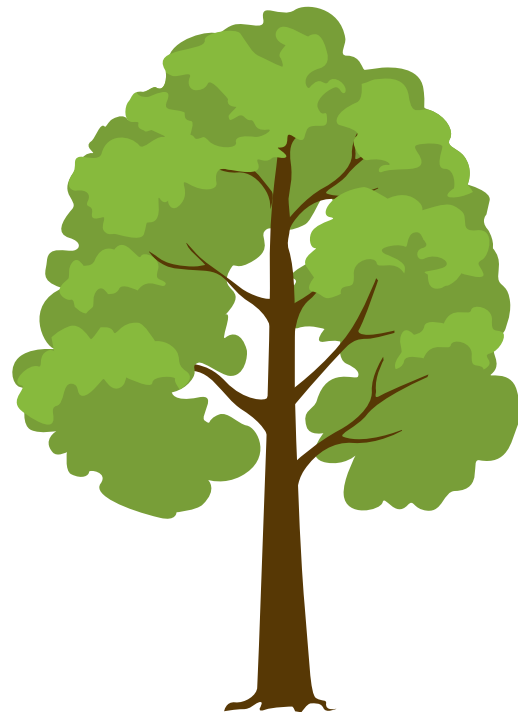
POST-LESSON EXPLORATIONS

Have learners complete any of these prompts:

- Learners can look up the largest trees in the world to compare their ages. Optional: Expand on this by learning about each tree's story.
- Set up the learners' paper tree projects in the classroom, or hang them in the hallway. Learners can create a poster or large comic strip to hang next to their project to help tell the tree's story and share what they have learned.

ADDITIONAL RESOURCES

- **“Reading the Rings of a Tree.”** Tree ring example diagram to DOWNLOAD; from a paper manufacturer: <http://www.internationalpaper.com/docs/default-source/english/sustainability/treerings.pdf?sfvrsn=2>
- **“Tree Bark.”** Background info for educators on bark and inner structures of the tree trunk; from a conservation organization: <https://treesforlife.org.uk/into-the-forest/habitats-and-ecology/ecology/tree-bark/>
- **“Annual Growth Rings.”** Background info for educators (and possibly learners) on tree ring variations; from a paper manufacturer: <https://www.theforestacademy.com/tree-knowledge/annual-growth-rings/#.XqtH9P1KjIU>
- **“Dendrochronology: What Tree Rings Tell Us About Past and Present.”** Background info for educators; from an informational site: <https://www.environmentalscience.org/dendrochronology-tree-rings-tell-us>



ADAPTATIONS / OPTIONS FOR ACCESSIBILITY

- **For classroom explorations:** If trees are not accessible, gather pictures of different kinds of bark and have learners draw what they see on kraft paper to create the cylinder and make the project. Pre-cut paper to appropriate sizes in advance.
- **For virtual explorations:** Have learners create a miniature version of the project using one 8.5" x 11" piece of paper to make the cylinder and another piece to trace the cylinder and create the disc for the tree rings. Instead of having them do bark rubbings, show learners pictures of different kinds of bark, and have them draw what they see on the first piece of paper. Have them write stories individually instead of in small groups.
- **Other adaptations:** Instead of writing a story, learners could tell the story of their tree orally or through a comic strip.

WORD BANK

adaptation: the process that allows an organism to adjust to the environment it lives in and helps it survive

annual: when something happens every year

bark: the protective outer layer of a tree; can be compared to skin

dendrochronology: the technique of reading annual growth rings to determine a tree's age

external structures: the outer parts of an organism that help it live

growing season: the time of year when a tree adds a new layer to its trunk, usually during spring and summer

internal structures: the inner parts of an organism that help it live

tree rings: the natural markings of a tree's growth, indicating its age; across the width of the trunk



Name: _____

The Story of a Tree

First-Year Growth

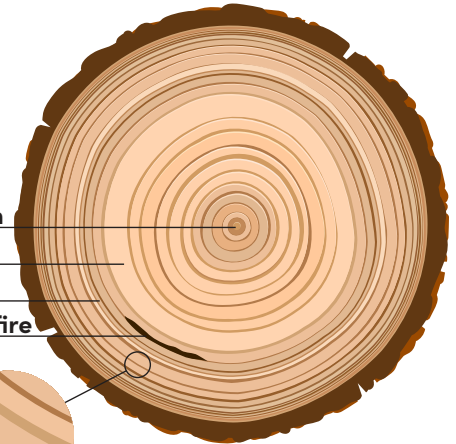
Rainy year

Dry year

Scar from forest fire

Spring/early summer growth

Late summer/
Fall growth



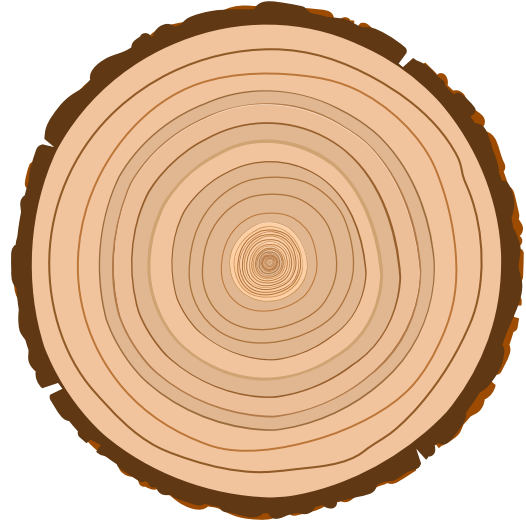
Draw a tree and its rings in the box above.

Write the story of your tree and the challenges it faced while trying to survive.

Example Tree Stories

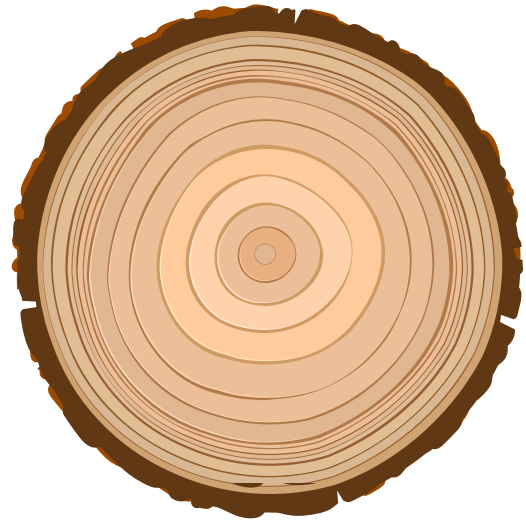
STORY 1

Our tree sprouted from a tiny seed in a deep, dark forest, many years ago. When it was young, it couldn't get much sunlight. All the older trees blocked the light from reaching it. So our tree grew very slowly, and its rings were tiny for many years. Then one day, there was a big storm! Wind blew down several of the tall trees around our tree. Everything changed from then on. The sunlight could reach our tree, and it started to grow much faster. It got much taller and wider in just a few years. Now it's almost as tall as the other trees nearby.



STORY 2

We learned that sometimes people plant trees for privacy. We think some people here wanted trees that would grow into a kind of fence really fast. We picked one of these trees to tell its story. In its first eight years, it grew superfast, along with all the trees in the row. But then all the trees got big enough that they were soaking up water too fast. And then there were some years with not much rain. After four years when our tree and the other trees were growing really slowly, people noticed that they needed more water. Around three years ago, people gave our tree a sprinkler to water it. And it started growing faster again!



STORY 3

I started out life in a plant nursery. People took care of everything I needed. I got lots of water, fertilizer, and sunlight. It was great until my roots got too cramped in my pot. It was time to move out. They drove me to this spot and planted me in this garden. I was ready to stretch out and grow more. But I had a hard time for the first few years because I was attacked by insects! Luckily, I was strong, and I healed, even though I still have some scars. After that, I started to get really comfortable. I'm not a fast grower, but I like making lots of beautiful blossoms every year.

