DFW Earth Day 2026

Lesson Plan Information

Name: Tree Scientists – Exploring Biodiversity through Trees

Grades: K-12

Topic: Students become tree scientists by completing a series of mini-experiments that reveal how trees support life and the broader ecosystem. Together, these hands-on investigations demonstrate how trees grow, interact with their environment and contribute to local biodiversity.

Time: 30-45 mins. (each experiment)

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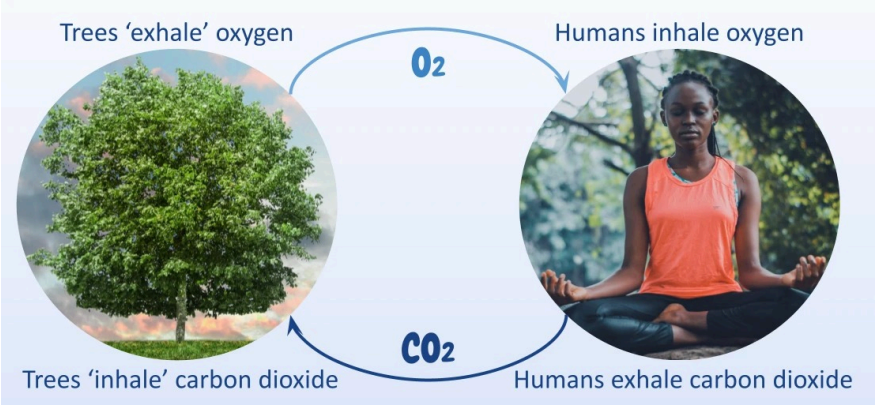
Introduction:

Trees are amazing helpers for our planet and for us. Trees play an important role in the environment. They give us clean air to breathe by producing oxygen and absorbing carbon dioxide. They improve air quality by filtering pollutants like dust, smoke and harmful gases. They regulate temperature by providing shade. They provide habitat, food and shelter for wildlife. Planting and protecting trees benefits everyone and the planet.

The Air We Breathe

Does a tree or plant breathe the same as humans do? No, humans have lungs and a respiratory system. Humans take in air with oxygen and as they exhale, they release carbon dioxide. A tree or leaf doesn't have any lungs or respiratory system, but they still breathe in their own way. Trees take in carbon dioxide from the air through their stomata. With the help of sunlight and water, trees then release oxygen which is the clean air we breathe. This process is called **photosynthesis**.



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How Old are Trees?

Knowing how old a tree is helps us understand the ecosystem better. A tree's age helps scientists, like arborists and dendrologists, understand how a forest developed over time. Older trees often support more wildlife and insects, and knowing their age shows how healthy and stable an ecosystem is. Tree rings record past weather conditions. By knowing a tree's age, researchers can study droughts, floods, fire, and climate changes that happened decades or even centuries ago. Very old trees are often rare and valuable. Knowing their age helps identify trees that should be protected because of their ecological, cultural or historical importance.

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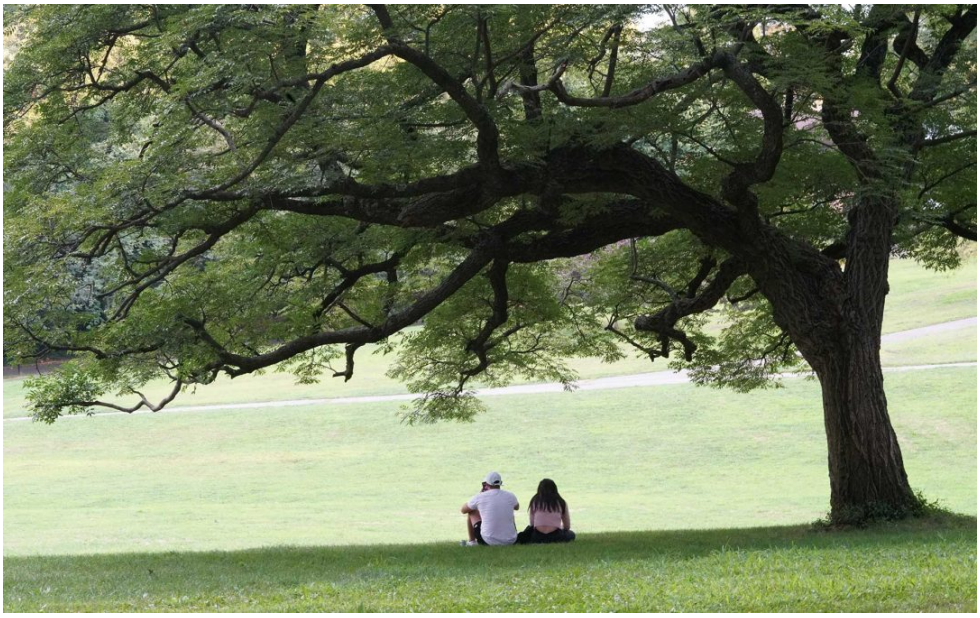
Made in the Shade

We all know standing under a tree is a great way to cool off. Trees lower the temperature through a combination of shade, evapotranspiration and air movement. Shade blocks direct sunlight from reaching the ground and your body. Less direct sunlight means you absorb less heat and stay cooler. Evapotranspiration is when a tree's leaves release water into the air, like sweating. That water cools the air. Trees also help move hot air around and spread cooler air around shaded areas. That's why it is called a **cool breeze**.



In an effort to combat the growing loss of trees and to maintain the valuable benefits they provide, Dallas Fort Worth International Airport (DFW) has developed a Tree Conservation Plan. This plan protects thousands of acres of native trees and habitat across airport property. These trees play a major role in supporting biodiversity, providing wildlife habitat, improving air quality, capturing stormwater and storing carbon. By studying trees through this kit, you are mirroring the work DFW does to preserve natural spaces and maintain a nature-positive airport landscape.

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Key Terms:

Arborist - a specialist in the cultivation and care of trees, including tree surgery, the diagnosis, treatment, prevention of tree diseases and the control of pests.

Dendrologist - a scientist who studies tree species, growth, structure and age.

Ecosystem - a community of living things (plants, animals, microbes) interacting with each other and with their non-living surroundings (like air, water and soil).

Evapotranspiration - the process where water moves from the land and plants into the air.

Photosynthesis - the process by which green plants make their own food using sunlight, water, and carbon dioxide from the air. During this process, plants use sunlight to change water and carbon dioxide into food and release oxygen into the air.

Stomata - tiny pores found mainly on the surface of leaves (and sometimes stems) of plants. They allow the exchange of gases, letting carbon dioxide enter for photosynthesis and releasing oxygen, and they also control the loss of water vapor through a process called transpiration.

Note: This kit has several small individual lessons that can be taught over a period of several days.

Exploring How Trees Breathe

Materials:

Kit will include:

- Clear plastic bowl (kids will work in pairs)

Not included in the kit:

- Live active leaf from a tree (one that you removed from the tree, not found on the ground)
- Small rock

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Procedure:

1. Working in pairs, have the kids fill their clear plastic bowl with lukewarm water. Take the kids outside with their bowls of water and have them remove a leaf from a tree. Immediately place the leaf in the bowl of water and place a small rock on top of the leaf so it is fully submerged.

2. Place the bowl in a sunny spot and wait approximately two hours.

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3. Have the kids check their leaves after two hours. They should see small bubbles that have formed around the leaf and the edges of the bowl. The leaf is using the sunlight as part of the photosynthesis process, where leaves convert sunlight to energy. As a leaf creates that energy, it needs to get rid of the items it no longer needs so it will expel the extra oxygen during photosynthesis. As the leaf releases extra oxygen while submerged, the oxygen can be seen as bubbles in the water.
4. Ask the kids what would happen if they held their breath, went under the water in a pool and then let their breath out. They would see bubbles coming up in the water. That is what they are seeing.

Calculating the Age of a Tree

Materials:

Kit will include:

- Tape measure
- Texas Trees and Wildflowers Pocket Guide
- Growth Factor Worksheet
- Tree discs

Not included in the kit:

- Calculator

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Procedure:

1. One way to estimate the age of a tree is to measure it's circumference or how big around the trunk is.
2. Working in pairs, have the kids identify what species of tree they're looking at. Use the Texas Trees and Wildflowers Pocket Guide to help identify the trees. If there are not enough trees have the kids take turns. Record the tree species on the worksheet.
3. Next, they need to identify the growth factor for that tree. A growth factor is a special number that's specific to each tree species. It represents how much thicker the trunk grows each year. This can be googled on a smartphone. Record the growth factor on the worksheet.
4. Once you know what type of tree you're working with and what its growth factor number is, you need to figure out its diameter at breast height or DBH. Measure 4.5 feet or 54 inches above the ground on the tree trunk. Mark that spot with a finger and then wrap the tape measure around the trunk of the tree at that spot. That is the circumference. Record that number on the worksheet.

5. Using the formula provided, calculate the diameter of the tree. Record the diameter on the worksheet.
6. Now multiply the diameter in inches by the growth factor to determine the tree's age. What year did the tree start growing? Record the year on the worksheet.
7. Another way to tell the age of a tree is to count the annual rings. Counting tree rings is one of the most accurate ways to determine a tree's age. Every year, the tree grows a new layer of wood below the bark, which makes the trunk grow wider. The rings vary in size, depending on the growth that has occurred. Tree growth is affected by the availability of nutrients, water and other factors.
8. Hand out a tree disc to each student.

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9. Start in the middle of the cross-section of wood and count the first dark ring you see. Continue counting outwards from the middle ring until you reach the last dark ring. The total number of dark rings represents the age of the tree in years.
10. Don't count the bark of the tree as a dark ring. It doesn't represent a year of growth because the bark just continues to get pushed out as the tree grows from the inside.
11. Look for wide, evenly spaced rings that represent years of good weather. The broadest rings on a tree indicate years during which the tree received lots of sunlight and rain. The tree was able to grow a lot during these years, leading to big rings.

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12. Spot narrowly spaced rings to determine when there were dry years. A narrow ring on a trees trunk represents a year when there was not a lot of rain. Clusters of narrow rings indicate several years of drought.

13. How old is your tree? Record it on the worksheet.

Note: The tree discs make great craft projects. Plan a fun art activity with the kids and their discs.

Temperature Regulation

Materials:

Kit will include:

- Thermometer

Procedure:

1. This experiment requires the kids to head outside. Working in pairs, have the kids set their thermometer in the sun so it can record the temperature. This may take several minutes until the temperature stops moving. Record the temperature on the worksheet.

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2. Next. place the thermometer in the shade under a tree. Wait until the temperature stops moving. Record the temperature on the worksheet.

3. Have the kids explain why the temperature changed on the worksheet.

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Key Takeaways

After completing this activity students will:

- Learn about the value of trees.
- Improve observation skills.
- Improve math skills.

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Tree Age Determination Worksheet

Age of a Live Tree

Tree name (species): _____

Growth factor: _____

Determine the age of the tree:

1. Measure tree circumference (distance around the trunk) in inches about 4.5 ft or 54 inches above ground level: _____

2. Calculate Diameter: _____

    Diameter = circumference ÷ 3.14 (pi)

3. Multiply the diameter in inches by the appropriate growth factor to determine the estimated age of your tree: ____

    Diameter in inches X growth factor = tree age

What year did this tree begin growing? _____

Current year – age of tree = year tree began growing

Counting Rings

How many rings did you count? _____

How old was this tree when it was cut down? _____

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Temperature Regulation

What was the temperature in the sun? _____

What was the temperature in the shade? _____

Explain the differences in the temperatures:

_____

_____

_____

_____

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_____

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