

Photo Description



This image shows a lawn completely covered with fallen autumn leaves in shades of red, yellow, orange, pink, and brown. Green grass peeks through the colorful blanket of leaves, and in the background you can see a house with a basketball hoop and trees. This is a classic example of what happens each fall when trees stop sending water and nutrients to their leaves.

Scientific Phenomena

Anchoring Phenomenon: Leaf color change and leaf fall (senescence)

Why It's Happening:

As temperatures drop and days get shorter in autumn, trees prepare for winter by stopping the flow of water and nutrients to their leaves. When this happens, the green chlorophyll (the pigment that helps trees make food) breaks down. This reveals other colors that were always in the leaves but hidden by the green—yellows, oranges, and reds. Eventually, trees drop their leaves entirely to conserve water and energy during the cold winter months when the ground freezes and water isn't available to the roots. This is a survival strategy that helps trees survive harsh winter conditions.

Core Science Concepts

- * **Seasonal Changes:** Earth's tilt and position in its orbit around the sun cause temperature and daylight length to change throughout the year, triggering different plant behaviors in each season.
- * **Plant Life Cycles and Adaptations:** Trees have adapted to survive winter by entering dormancy (a resting state) and shedding leaves, which is an inherited behavior that helps them survive in temperate climates.
- * **Photosynthesis and Chlorophyll:** Green leaves use chlorophyll and sunlight to make food for the plant. In fall, when photosynthesis slows, other pigments (carotenoids and anthocyanins) become visible, creating the colors we see.
- * **Energy and Resource Conservation:** By dropping leaves, trees reduce water loss through transpiration and conserve stored energy for survival during winter when growing conditions are poor.

Pedagogical Tip:

Help students connect leaf color change to a real-world experience they've had. Ask them to recall a time they noticed leaves changing color during a family outing or walk. This personal connection makes the phenomenon memorable and meaningful. You might also keep a leaf color journal throughout fall, collecting samples weekly to track the progression of changes in your own neighborhood.

UDL Suggestions:

To support multiple learners:

- **Representation:** Use photos, real leaf samples, and color charts to show leaf color changes. Create a visual "leaf progression timeline" on the classroom wall.
- **Action & Expression:** Allow students to show understanding through drawing, sorting leaves by color, creating a leaf collage, or writing about what they observe.
- **Engagement:** Connect to student interests by having them collect leaves from home, measure them, or press them for a classroom display. Make it a class treasure hunt!

Discussion Questions

- * What causes the leaves to change color in the fall? (Bloom's: Understand | DOK: 1)
- * Why do you think trees drop their leaves in autumn instead of keeping them all year? (Bloom's: Analyze | DOK: 2)
- * If a tree didn't drop its leaves before winter, what problems might it face? (Bloom's: Evaluate | DOK: 3)
- * How would the life cycle of a tree be different if we lived in a place where it never got cold? (Bloom's: Create | DOK: 3)

Extension Activities

Activity 1: Leaf Color Investigation

Collect 5-6 leaves of different fall colors from your school grounds or neighborhood. Have students measure the leaves, sort them by color, and create a bar graph showing which colors are most common. Students can predict which colors they'll see most and test their predictions. This connects to data collection and graphing skills while deepening observation of the phenomenon.

Activity 2: Paper Chromatography Leaf Pigments

Conduct a simple chromatography experiment using coffee filters, fallen leaves, and rubbing alcohol. Students will see the hidden pigments in leaves separate into distinct colors, making the science of color change visible and concrete. (Note: Adult supervision required for alcohol use; use only a small amount in sealed containers.)

Activity 3: Seasonal Tree Journal

Create a class or individual "Tree Through the Seasons" journal. Take photos of the same tree (or tree location) once a month throughout the school year. Have students record observations about color, leaf presence, temperature, and daylight hours. This long-term investigation helps students recognize patterns and understand that seasonal changes are predictable and cyclical.

NGSS Connections

Performance Expectation:

4-LS1-1: Use a model to describe that animals receive different types of information through their senses, process that information in their brain, and respond to the information in different ways.

4-ESS2-1: Make observations and measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

Relevant Disciplinary Core Ideas:

- 4-ESS1.A The Universe and its Stars
- 4-ESS2.E Dynamics of Earth's Systems
- 3-LS4.B Natural Selection

Crosscutting Concepts:

- Patterns - Seasonal patterns repeat each year
- Systems and System Models - Trees are part of a larger ecosystem system affected by seasonal changes
- Cause and Effect - Shorter days and colder temperatures cause leaves to change color and fall

Science Vocabulary

- * Chlorophyll: The green pigment in leaves that helps plants capture sunlight and make their own food.
- * Photosynthesis: The process plants use to turn sunlight, water, and air into food and energy for growing.
- * Dormancy: A deep sleep-like state that plants enter to survive harsh winter weather.
- * Senescence: The scientific term for the aging process in plants, including the yellowing and falling of leaves in autumn.
- * Transpiration: The process where water absorbed by plant roots evaporates from the leaves into the air.

External Resources

Children's Books:

Leaf Man* by Lois Ehlert – A colorful picture book that uses real leaves to tell a story and celebrate autumn leaves

Why Do Leaves Change Color?* by Betsy Maestro – A clear, illustrated explanation of leaf color change designed for elementary readers

Come On, Rain!* by Karen Hesse – A poetic picture book capturing the feeling of seasonal change and weather patterns

YouTube Videos:

* "Why Do Leaves Change Color?" – Crash Course Kids

A fun, animated explanation of chlorophyll, pigments, and why leaves change color in fall. Approximately 4 minutes.

<https://www.youtube.com/watch?v=xGbcKOq5aW4>

* "The Four Seasons" – National Geographic Kids

A 5-minute overview of seasonal changes including autumn leaf color and plant dormancy, with stunning photography and clear explanations.

<https://www.youtube.com/watch?v=xfKmKxLoKYI>