

## Photo Description



This image shows a yard covered with fallen leaves in many colors—red, yellow, orange, pink, and brown. Green grass peeks through the pile of leaves beneath a backyard with a basketball hoop and house visible in the background. The leaves have changed color and fallen from the trees, which is a sign that fall (autumn) has arrived.

## Scientific Phenomena

**Anchoring Phenomenon:** Deciduous trees losing their leaves and changing color in autumn.

**Why This Happens:** As days get shorter and temperatures drop in fall, trees receive signals that winter is coming. Trees stop making food (through photosynthesis) and begin to close off the tubes that carry water to the leaves. Without water and nutrients, the green chlorophyll (pigment that makes leaves green) breaks down, revealing yellow and orange colors that were always there but hidden underneath. Eventually, leaves dry out and fall to the ground. Trees do this to survive winter when water in the soil freezes and becomes unavailable.

## Core Science Concepts

- Seasonal Changes: Earth's position and tilt create four distinct seasons, each with different weather patterns and environmental changes. Fall is characterized by cooling temperatures, shorter days, and trees preparing for winter.
- Plant Life Cycles: Plants go through cycles of growth, dormancy, and rest. In fall, deciduous trees enter a dormant state to conserve energy and water through the cold winter months.
- Pigments and Light: Leaves contain multiple pigments (chlorophyll = green, carotenoids = yellow/orange, anthocyanins = red/purple). Green chlorophyll masks the other colors during spring and summer, but as it breaks down in fall, the hidden colors become visible.
- Energy and Survival: Trees drop leaves to reduce water loss and preserve energy reserves in their roots and trunk for survival during winter when resources are scarce.

### Pedagogical Tip:

Third graders benefit from direct observation and hands-on exploration. Rather than lecturing about photosynthesis, invite students to collect and sort fallen leaves by color. Ask them to predict which colors they'll find most often and create a tally chart. This builds observational skills while grounding abstract concepts in concrete experience.

### UDL Suggestions:

**Multiple Means of Representation:** Create a visual anchor chart showing the four seasons with pictures and color samples. Include both photographs and student-drawn illustrations. Provide a simplified diagram showing chlorophyll breaking down and revealing other colors underneath—use actual colored paper or paint chips to make this tangible.

**Multiple Means of Action & Expression:** Allow students to demonstrate understanding through varied formats: drawing and labeling a leaf diagram, creating a color-sorting activity, writing/dictating sentences about fall changes, or building a timeline with pictures showing the progression from summer to fall.

**Multiple Means of Engagement:** Connect to student interests by discussing how they see fall in their own neighborhoods. Invite them to share fall traditions, foods, and outdoor activities. Use sensory language ("crunchy leaves," "cool air," "earthy smells") to encourage multiple senses.

## Discussion Questions

1. Why do you think trees drop their leaves in fall instead of keeping them all year long? (Bloom's: Analyze | DOK: 2)
2. What do you observe about the different colors of leaves in this picture? Where do you think those colors were hiding during the summer? (Bloom's: Analyze | DOK: 2)
3. If a tree didn't drop its leaves before winter, what problems might happen to the tree when it gets very cold? (Bloom's: Evaluate | DOK: 3)
4. How would this yard look different in spring or summer compared to how it looks in this fall picture? (Bloom's: Compare/Contrast | DOK: 2)

## Extension Activities

1. Leaf Color Investigation: Take students on a nature walk to collect fallen leaves. Back in the classroom, sort leaves by color and create a bar graph showing which colors are most common. Discuss why certain colors might be more common (e.g., yellows and oranges are revealed in most trees, while reds depend on tree species and weather). Challenge students to predict which colors would appear if they collected leaves from different types of trees.
2. Chlorophyll Chromatography (Simplified): Provide paper towels, markers, and a small cup of water. Have students cut paper towel strips, draw a line with a green marker near the bottom, and place the towel in water (the water should just touch the line). As water travels up, it will separate the green marker into different colors, demonstrating that "green" is actually multiple colors mixed together. Repeat with other fall colors.
3. Seasonal Bulletin Board Timeline: Create a four-season photo display with the fall image as a starting point. Have students draw or collect pictures showing the same yard/trees in summer, fall, winter, and spring. Write descriptive sentences about what plants, weather, and animals look like in each season. This reinforces the cyclical nature of seasons and seasonal patterns.

## NGSS Connections

Performance Expectation: 3-LS4-1 - Analyze and interpret data from fossils to support an explanation for changes in organisms over time. (Note: While this image most directly supports seasonal/weather standards below, it can scaffold understanding of life cycles)

Disciplinary Core Ideas:

- 3-ESS2.D - Weather and Climate: Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.
- 3-LS1.A - Structure and Function: All organisms have input and output. Plants acquire their material for growth chiefly from air and water.

Crosscutting Concepts:

- Patterns - Seasons follow a predictable pattern; trees respond to seasonal patterns by changing colors and dropping leaves.
- Cause and Effect - Shorter days and cooler temperatures cause trees to stop producing chlorophyll and drop leaves.

## Science Vocabulary

- Chlorophyll: The green pigment (colored substance) in leaves that helps plants make food from sunlight.

- Deciduous: A type of tree that loses all its leaves in fall and grows new ones in spring.
- Dormant: When a plant or animal is resting and not growing or very active, like trees in winter.
- Pigment: A natural color-maker in leaves and other things; different pigments create different colors.
- Photosynthesis: The process plants use to turn sunlight, water, and air into food for themselves.
- Season: One of the four parts of the year (spring, summer, fall, winter) with its own weather patterns.

### External Resources

Children's Books:

- Why Do Leaves Change Color? by Betsy Maestro (simple, scientifically accurate explanation)
- Fall Leaves by Loretta Holland (focuses on observation and color changes)
- The Busy Tree by Jennifer Ward (celebrates seasonal changes and tree life)

YouTube Videos:

- "Why Do Leaves Change Color?" by SciShow Kids — Clear, engaging explanation of chlorophyll and pigments. <https://www.youtube.com/watch?v=1H-H28G-xyA>
- "Autumn Leaves: Why Do Trees Change Color?" by National Geographic Kids — Beautiful visuals paired with kid-friendly narration about seasonal triggers. <https://www.youtube.com/watch?v=xJJYtsjeZAU>