

The background features a vibrant yellow field with numerous colorful autumn leaves in shades of red, orange, and green. Radiating lines emanate from the center, creating a sunburst effect. Small white dots are scattered throughout the background.

# **Introductory Lessons for Buds, Leaves and Global Warming**

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CONNECT  
TO  
PRIOR KNOWLEDGE

# GETTING STARTED

- Brainstorm everything the students “know” about autumn and leaves changing colors and falling off of the trees. Keep on chart paper to revisit as the investigation proceeds.
- Take the True/False quiz. Go over answers but keep them to revisit as well.



## True and False Questions

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- × Chlorophyll give leaves their basic green color.
- × Carotenoids produce the yellow, oranges and brown colors in corn, carrots and bananas.
- × The length of the night is a main reason in telling the leaves when to change color.
- × Leaf out is when the leaves fall off of their branches.
- × It does not matter the species of tree, the leaves on the trees can turn any color they want.
- × Stems, twigs and buds are made to survive freezing cold and can reawaken in the Spring.

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READ  
AN  
ARTICLE



# WHY LEAVES CHANGE COLOR

By the: U.S. Department of Agriculture

- ✘ How does autumn color happen?
- ✘ Where do autumn colors come from?
- ✘ How does weather affect autumn color?
- ✘ What triggers leaf fall?
- ✘ What does all this do for the tree?
- ✘ What happens to all those fallen leaves?
- ✘ Where can I see autumn color in the United States?

<p>How does autumn color happen?</p>	<p><u>3 factors that influence autumn leaf color:</u></p> <ul style="list-style-type: none"><li>• _____</li><li>• _____</li><li>• _____</li></ul> <p><u>Regulated by:</u></p> <ul style="list-style-type: none"><li>• _____</li><li>_____</li><li>_____</li></ul>
<p>Where do autumn colors come from?</p>	<p><u>3 Types of Pigments:</u></p> <ul style="list-style-type: none"><li>• <i>Chlorophyll</i> - _____</li><li>• <i>Carotenoids</i> - _____</li><li>• <i>Anthocyanins</i> - _____</li></ul>

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# INTRODUCE VOCABULARY



x Name: \_\_\_\_\_ Block: \_\_\_\_\_

x Mrs. Mossman/Life Science

x <http://harvardforest.fas.harvard.edu/museum/phenology.html>

x Harvard Forest Schoolyard Ecology

x Harvard University

x Buds, Leaves, and Global Warming

x Sept. 2013-May 2014

x We will be assisting Forest Ecologist Dr. John O'Keefe in his research on deciduous trees. His research has been going on since 1990. We will help gather data to answer the following questions:

x When does the growing season for trees in our schoolyard end this autumn, and when does the new growing season begin in the spring?

x How might the length of the growing season relate to climate?

x

x Vocabulary:

x phenology: \_\_\_\_\_

x deciduous: \_\_\_\_\_

x coniferous: \_\_\_\_\_

x chlorophyll: \_\_\_\_\_

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PRACTICE  
OBSERVATION  
PROTOCOL  
INDOORS

### Lab Group Rubric

Skill	4	3	2	1
Following Directions	I followed all directions including stopping when the lights went out.	I followed most of the directions and stopped when I realized the lights were out.	I needed a reminder from Mrs. M. about directions and quieting down when the lights went out.	I needed many reminders from Mrs. M. about directions and quieting down.
Focus	I stayed on task throughout the entire lab.	I stayed on task through most of the lab.	I needed a reminder from Mrs. M. to stay on task.	I needed many reminders from Mrs. M.
Equipment Use & Safety	I used the equipment carefully and correctly.	I used the equipment carefully.	I need to be more careful with the equipment.	I needed many reminders on how to use the equipment correctly.
Cooperation	I cooperated with all of the members of my group.	I did my best to cooperate with the others in the group.	Mrs. M. had to come over to discuss my cooperation.	The group did not run smoothly because I was frequently off task.
Clean-up	I worked hard helping with clean-up.	I helped with clean-up.	I didn't help very much with clean-up.	I left the group before clean-up was done.

# HOW TO MEASURE

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- ✘ On the board, show students how to measure length and width of a leaf.
- ✘ On the "Key to Trees" worksheet, have them practice measuring and go over it together since all of the leaves are the same.
- ✘ "Key to Trees" is also an introduction to a dichotomous key.

# NOW MOVE TO STATIONS

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- ✘ At each station have 6 leaves taped down.
- ✘ Using the Autumn Student Data Sheet have students measure each leaf and estimate % color changed.
- ✘ Leave data sheets at stations so other classes can compare.
- ✘ Also have branches with blue flagging marking where to start counting the 6 leaves to practice.

# LEAVE THE DATA SHEETS

- ✘ If you have multiple classes, have each class leave the data sheets face down next to the leaves they observed.
- ✘ Future groups will do their own observations then check with the completed data sheets from other classes or groups.
- ✘ Measurements and percentages that don't match up will give you a heads up which students will need more practice.

# NOW HEAD OUTDOORS

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Practice using the Outdoor Classroom Rubric with the "Unnatural Walk" activity.

## Outdoor Classroom Rubric

Skill	4	3	2	1
Following Directions	I followed all of the directions for the observation or activity.	I followed most of the directions.	I needed a reminder from Mrs. M. about directions.	I needed many reminders from Mrs. M. about directions.
Safety	I followed all safety instructions.	I followed most safety instructions.	I needed a reminder from Mrs. M. to stay safe.	I needed many reminders from Mrs. M. about the safety behaviors.
Activity	I worked very hard on the observation or activity.	I did pretty well on the observation or activity.	I need to work harder on the observation or activity.	I had a lot of difficulty on the observation or activity because I just wasn't trying.
Listening	I stopped and listened every time it was signaled.	I stopped and listened most times it was signaled.	Mrs. M. had to remind me to stop and listen when it was time.	I needed many reminders to stop and listen.



# NOW HEAD OUTDOORS

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Once you are comfortable with the outdoor portion of your classroom management, head out to meet your trees!