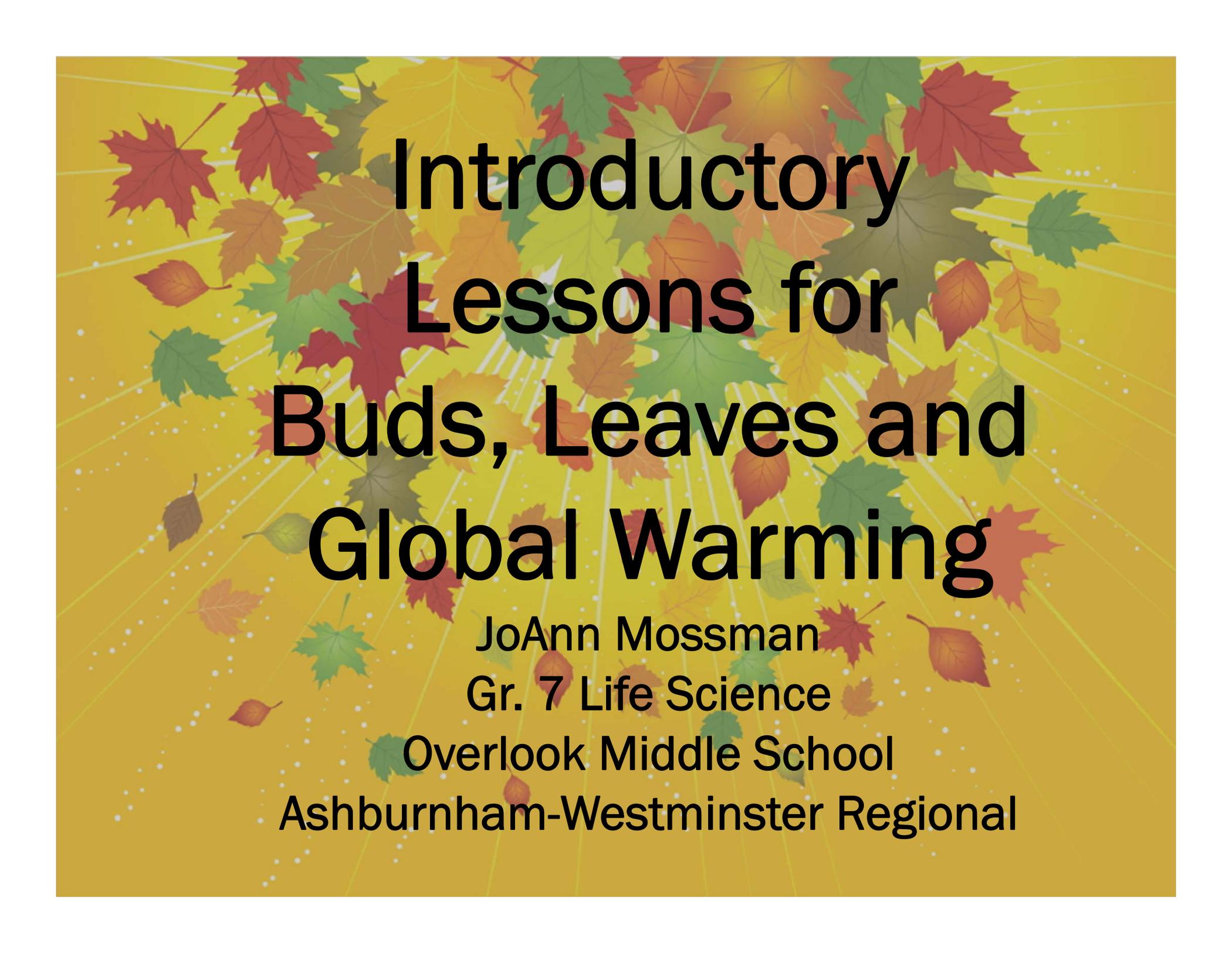




Harvard LTER Schoolyard Program

Teacher Developed Lessons and Documents that integrate Harvard Forest Schoolyard Ecology Themes into curriculum.

- Lesson Title:
Introductory Lessons for Buds, Leaves, and Global Warming
- Teacher/Author: JoAnn Mossman
- School: Overlook Middle School
- Level: Middle School-7th Grade
- Date: April 3, 2014

The background features a vibrant yellow and orange gradient with numerous colorful autumn leaves in shades of red, orange, yellow, and green scattered across it. Faint white sun rays radiate from the center, and small white dots are scattered throughout the background.

Introductory Lessons for Buds, Leaves and Global Warming

JoAnn Mossman

Gr. 7 Life Science

Overlook Middle School

Ashburnham-Westminster Regional

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

- × 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.



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">• _____• _____• _____ <p><u>Regulated by:</u></p> <ul style="list-style-type: none">• _____
<p>Where do autumn colors come from?</p>	<p><u>3 Types of Pigments:</u></p> <ul style="list-style-type: none">• <i>Chlorophyll</i> - _____• <i>Carotenoids</i> - _____• <i>Anthocyanins</i> - _____

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: _____

OBSERVATION PREPARATIONS #1

"A Seedy Character"

- ✘ Have students bring in a seed pod
- ✘ In their science journals they sketch, make observations in writing and ask questions
- ✘ They think about/predict how it germinates in the spring
- ✘ They put the seeds into categories based on a variety of characteristics

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.

OBSERVATION PREPARATIONS #2

- ✘ Set up lab stations with a variety of branches.
 - ✘ Review "Lab Group Rubric"
- ✘ In their science journals, students will sketch and write observations for "Be a Leaf Peeper"
- ✘ Focus on shape, texture, colors, smells, functions. They cannot ask "What tree is it?"

HOW TO MEASURE

- ✘ On an overhead, 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

- ✘ 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.

NOW HEAD OUTDOORS



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.

TIME TO MEET YOUR TREE!

Predictions:



• Autumn Prediction:

Based on your initial observations of your tree and thinking back to the weather factors that may impact leaf fall, when do you think leaves will begin to fall and when will all of your leaves have fallen off of your branch? Why?

• Spring Prediction:

Thinking about the winter and beginning of spring we've had, when do you think your branch will begin to leaf out and completely finish leafing out? Why?

• Sketch a close-up of your branch. Label the terminal leaf(leaves) and number your leaves 1-6. Sketch your tree on the back of this page. Estimate the height.

LATER ON...GRAPHING

- ✦ Students take data off of copies of metadata you have from previous years.
- ✦ After filling in the data table, they can graph growing seasons, leaf fall dates, and bud burst dates of just their study tree or all of the trees in your schoolyard study.

Year

Spring Bud Burst

Autumn Leaf Fall

Growing
Season

first bud open

100% leaf fall

total # of days

	Calendar Date	Julian Day	Calendar Date	Julian Day	
2010					
2011					
2012					
2013					
2014					