Title of Lesson Plan	The Tree Detective – Basic Dendrology
Prepared By (first and last name)	Michael Tiffany
City and State	Newark, NY
Grade Level(s)	11^{th} & 12^{th}
Keywords (subjects covered)	Classification, dendrology, alternate, opposite, compound, simple, serrated, lobed, coniferous, deciduous
Brief Description	Students will learn through literacy, visual, tactile, and inquiry based lesson, the process of tree identification and what species are common to their local climate/environment. Students will be initially "quizzed" through a series of slides to stimulate thought and determine relative knowledge level of the class. Students will then be refreshed as to use of a dichotomous key and introduced to a field guide. The basics of leaf and needle structure and form will be introduced. The students will then be asked to identify 6 species of trees in an inquiry based activity and explain how they came to their conclusions.
Total Time Required	Approximately 2 – 40 minute class periods
Setting	Classroom and Ontario Pathways and surrounding forests
Lesson Objectives/Goals	Concepts to Be Covered: • Each tree has its own name. • You need to know how to identify trees if you want to explore each tree's individual traits and uses. • "Dendrology" is the science of tree identification. • Trees have a common name and a scientific name. We will use the common name in this lesson. • Leaves are the most common identifying trait of a tree. • Coniferous trees retain their needles (or leaves) all year, but deciduous trees drop their leaves in the fall. • Some trees have simple leaves. Some trees have compound leaves. • Some leaves have opposite branching and others have alternate branching. • Some leaves have serrated leaf margins and others have lobed leaf margins. • Some trees have single needles and others have clustered needles. • Identification charts called keys are used to identify unfamiliar trees.

Lesson Objectives/Goals con't.	Goals for the Lesson: • Students will be able to explore the differences between trees. • Students will be able to recognize the word "dendrology." • Students will learn that the most common identifying trait of a tree is the leaves. • Students will learn that some trees have needles and some have leaves. • Students will see the difference between compound leaves and simple leaves. • Students will see the difference between opposite arrangement and alternate arrangement. • Students will be able to use a summer key to identify trees.
Materials Needed	Tree identification keys for Western New York, PPT slides of common trees, leaves, needles, leaf configuration, needle arrangements, etc., projector or smart board,

Standards Addressed	NYS Learning Standards: **Standard 4 - Science** 1- Living things are both similar to and different from each other and nonliving things. 4- The continuity of life is sustained through reproduction and development. **Standard 1- Inquiry, Analysis and Design** Scientific Inquiry - #1 - The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process. #2 - Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity. #3 - The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena. **ELA** Standard 1 – Language for Information and Understanding #1 -Listening and reading to acquire information and understanding involves collecting data, facts, and ideas; discovering relationships, concepts, and generalizations; and using knowledge from oral, written, and electronic sources. #2 - Speaking and writing to acquire and transmit information requires asking probing and clarifying questions, interpreting information in one's own words, applying information from one context to another, and presenting the information and interpretation clearly, concisely, and comprehensibly. #3 - Speaking and writing for critical analysis and evaluation requires presenting opinions and judgments on experiences, ideas, information, and issues clearly, logically, and persuasively with reference to specific criteria on which the opinion or judgment is based.
Procedure	**Activity 1: Prepartion** Every student will receive a handout concerning leaves and their attributes. They will contain drawings of alternate and opposite branching, compound and single leaves, and single and clustered needles. Lectures, drawings and PPT slides will be used to explain the differences between the leaves. Each student will be given a copy of the. *Tree Finder: A Manual for the Identification of Trees.* The students will use the guide to

Procedure con't.	identify the trees. During the lesson, the class will be divided into four different groups. The students in these groups will work together when the class is outside. **Activity 2: Explore** Each person from each group will review all their handouts. Whenever the class is outside, each of the four groups will stay separated. The students within the group can and should work together to find leaves from different trees. The students will collect at least five different leaves from five different deciduous trees and one coniferous tree. The students should collect both a simple and a compound leaf. The students should collect one opposite arrangement leaf and one alternate arrangement leaf. **Activity 3: Explore and Reflect** This part is done inside the building. The students must mount the leaves on a piece of paper in order to show them to the class. Each group will present their leaves to the class. Their presentations will include the name of the leaf, and how the students used the key to determine the correct name. **Activity 4: Apply** The process of identifying leaves will give the students an ongoing appreciation of variations in trees and types of lumber. We will explore as a class when tree identification could be valuable and what type of careers would this skill be necessary. **Assessment** The students will collect and identify the leaves and present them to the class. **Conclusion** Examination of leaves is one of the easiest ways to identify trees in the summer. More experienced people who have studied trees are able to identify trees through bark, buds, twigs, growing conditions. Students who show keen interest could be given extended assignments to foster deeper understanding and knowledge and also lead to a self directed discovery of possible career opportunities available.
Assessment	The students will collect and identify the leaves and present them to the class.

Literature Cited/References	Watts, May T., (1963). Tree Finder: *A Manual for the Identification of Trees by Their Leaves.* Nature Study Guild. Any Botany Text.
Forestry Tour Attended	Saranac Lake, NY 2007

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