Unit Overview:

I wanted to make sure that the lessons I developed were going to be implemented this year with my 6th graders during the ecology unit. I team teach with two other colleagues and I wasn't able to meet with them until 9-1-11. I felt it was necessary to collaborate with them before developing and completing my lessons. Since all three of us teach sixth grade science. My colleagues and I are confident that our students will enjoy and benefit from these five lessons.

Lesson One-Tree ID

Sources:
What is a tree, National Arbor Day Foundation
Trees: A Pocket Naturalist Guide by James Coffman
Michigan Trees by Barnes and Wagner

Objectives:
Students will learn to identify ten common indigenous trees found in Michigan.
Students will make observations, take notes, and use several tree guides and manuals to identify each tree.
Photographs will be taken of each tree to use in a power point presentation as part of the assessment.

Content Benchmarks:
L.OL.06.51 Classify organisms based on their source of energy for growth and development.
L.EC.06.21 Describe common patterns of relationships between and among populations.
L.EC.06.31 Identify living and nonliving components of an ecosystem.
S.IA.06.15 Use multiple sources of information to evaluate data of a population within the Great Lakes region.
S.IP.06.11 Generate scientific questions about populations based on observations, investigations, and research.

Materials:
Various Tree Guides
Field Notebooks
Camera
Pencils
Activity:
I will escort students as a whole group around the school grounds to ten different species of Michigan trees.
Students will use their senses of sight, touch, and smell to make observations and record data. Students will use the tree guides and books to analyze the data and determine the species of tree.
Students will record all data in their field notebooks.
Students will take turns taking photos of each tree’s bark, fruit, needles/leaves, trunk and canopy.

Assessment:
Students will be shown a power point presentation containing the ten trees that they were introduced to on the school yard field trip.
Students will be allowed to use their notes that they took during the trip to help identify the ten trees.
Lesson Two – Dendrochronology

Sources:
www.Wikipedia.com

Objectives:
Students will learn how to calculate the age of a tree based on its growth rings.
Students will also learn to identify events that have occurred during the tree's lifetime.
Students will make observations, collect, and analyze data to determine the tree species.

Content Benchmarks:
S.IP.06.11 Generate scientific questions about populations based on observations, investigations, and research.
S.IP.06.13 Use tools and equipment appropriate to a scientific investigation.

Materials:
Paper
Pencils
Ruler
Field Notebooks
Calipers

Activity:
Students will work in groups of two or three to make observations and collect data from a tree cross section (tree cookie).
The ten cookies will be the same ten species of trees from lesson one.
Students will use the data to determine the tree species, age, and growth rates compared to other species.
Each group will record data from as many of the ten samples as possible in a 50 minute period.
Students will generate questions based on observations of tree samples.
Students will enter their data in their Field Notebooks.

Assessment:
Students will use the data of all ten tree species to complete the table.
Students will develop three to five questions based on the observations of tree samples.
# Tree Cookie Table

Name: ____________________

Date: ____________________

Hour: ____________________

<table>
<thead>
<tr>
<th>Sample</th>
<th>Color of Bark</th>
<th>Texture of Bark</th>
<th>Other Characteristics</th>
<th>Number of Rings</th>
<th>Thickness of Widest Ring (mm)</th>
<th>Diameter of Sample (cm)</th>
<th>Tree Species Hypothesis</th>
<th>Actual Tree Species</th>
</tr>
</thead>
</table>
Lesson Three – Graphing Dendrochronology

Sources:
Data from Lesson Two.

Objectives:
Students will use data from Lesson Two Dendrochronology to construct a graph.
Students will use the graphs to identify growth patterns of various tree species.

Content Benchmarks:
S,IP.06.15 Construct charts and graphs from data and observations.
S.IA.06.11 Analyze information from data tables and graphs to answer scientific questions on patterns.

Materials:
Field Notebooks
Graph Paper
Pencils
Rulers
Colored Pencils

Activity:
Students will use the data from Lesson Two Dendrochronology to construct a colored bar graph.
Students will use their graphs to answer questions generated by the class in Lesson Two.

Assessment:
Students will complete the bar graph containing the data of all ten tree species from Lesson Two. (Example: Number of Rings on the Y axis, and Tree Species on the X axis, then another graph Diameter of cookie on Y axis and Tree Species on the X axis)
Students will correctly answer the questions generated by the class form Lesson Two.
Lesson Four—Scaling Timber

Sources:
Biltmore Stick

Objectives:
Students will determine the amount of linear board feet in a log.
Students will improve their hypothesis of how many linear board feet in a log with each measurement.

Content Benchmarks:
L.EC.06.41 Describe how human beings are part of the ecosystem of the Earth and that human activities can purposely or accidently alter the balance in ecosystems.
S.IP.06.13 use tools and equipment appropriate to the scientific investigations.
S.RS.06.27 Describe the effect humans and other organisms have on the natural balance of ecosystems.

Materials:
Biltmore Sticks
Pencils
Field Notebooks

Activity:
Students will be provided 4 eight foot log logs with various diameters.
I will haul them to school on a trailer for students to use for the activity.
Students will follow the directions on the Log Scale Table to complete the table.
Students will measure both ends of each of the four logs to determine which is the smallest.
Students will use a Biltmore stick to measure the smallest diameter of each of the four eight foot logs.
Students will record their data on the log scale table.
Log Scale Table

Name____________________
Date_____________________
Hour_____________________

Procedure:
Determine the top of each log (end with smallest diameter)

<table>
<thead>
<tr>
<th>Number of Log</th>
<th>Hypothesis</th>
<th>Measured</th>
<th>Actual</th>
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</tbody>
</table>

Assessment:
The log table will be completed accurately by students.
Lesson Five – How Big is your Tree?

Sources:
Project Learning Tree: K-8, American Forest Foundation, 2006-2010 (Activity #47)

Objectives:
Students will learn how to determine the height of a tree.
Students will test their hypothesis of each tree height using the basic measure technique.

Content Benchmarks:
S.IP.06.13 Use tools and equipment appropriate to the scientific investigation
N.FL.06.10 Add, Subtract, Multiply, and divide positive rational numbers fluently.

Materials:
Yard/Meter Sticks
Field Notebooks
Pencils
100 Foot Tape Measures

Activity:
I will escort students as a whole group around the school grounds to the same 10 trees as in Lesson One.
Students will estimate the height of each tree prior to measuring it.
Students begin this activity at a point where the distance from the trunk of the tree is close to the height of the tree.
Follow the directions on the worksheet and complete the worksheet.

Assessment:
Students will complete the table by accurately measuring each tree.
The accuracy of each hypothesis should improve with additional tree measured.
Directions:

Start where the distance from the trunk of the tree is close to the height of the tree.

At each tree hold the meter stick with one hand.

Completely extend that arm toward the tree being measured.

Tilt the Meter stick back towards their dominant eye, so that it touches the cheek below the eye while still being held with the arm fully extended toward tree.

With only the dominant eye open, align the bottom of the ruler where it touches the hand with the base of the tree; while at the same time align the top of the ruler with the top of the tree.

Move forward or back one step at a time until the ruler appears to cover the entire tree (arm with ruler must remain fully extended and steady while using only one eye to align ruler).

Mark location on the ground where alignment with ruler and tree occurs.

Use the 100 foot tape to measure from the mark of the tree to the base of the tree or pace the distance. (Multiply # paces by average distance of pace)

It should equal near the actual height of the tree.
<table>
<thead>
<tr>
<th>Tree</th>
<th>Hypothesis Estimate the Height in Feet</th>
<th>Triangulation Measurement of Tree in Feet</th>
<th>Actual Height of tree in Feet</th>
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