WAMC Lab Template

Math Concept(s): Volume of a Cone

Source / Text: N/A

Developed by: Per-Lars Blomgren E-Mail: plblomgren@vashonsd.org

Date: Summer Conference 2016

Attach the following documents:

Lab Instructions

1. Organize the class in groups of three or four (either before going out to the woods, or after)
2. Present the hook: A cord of wood costs $225. How much are particular trees worth?
3. Question the students as to what they need to know in order to solve the problem
4. After they are done, establish the important facts:
    a. One foot in a tree's diameter is directly proportional to 24 feet of height
    b. We will say that the trees are cone-shaped
    c. Volume of a cone= 1/3 times pi times the radius squared times the height
    d. A cord of wood is 128 square feet
5. Assign each group to a tree, and have them figure out how to answer the question

Student Handout(s)

(See attached)

Rubric and/or Assessment Tool

Formative- Assess student comprehension through observations and questioning

Summative- Grade worksheet and quiz

Indicate "*SPECIFIC*" relationship to Science, Technology, or Engineering

The relationship between a tree's diameter and its height is scientific, as is its growth. This relationship also is applicable to engineering.

Short Description (Be sure to include where in your instruction this lab takes place):

Lab Plan

Lab Title: To the Trees!

Prerequisite skills: Calculating diameter of a circle after measuring circumference; calculating area of a circle; understanding proportions

Lab objective: Students will use the equation for a cone's volume to help figure out the value of a tree in terms of its worth in firewood.

Standards:

Mathematics K–12 Learning Standards:

- Geometric Measurement and Dimension- G-GMD
- Modeling with Geometry- G-MG

Standards for Mathematical Practice:

- MP1- Make sense of problems and persevere in solving them
- MP4- Model with mathematics
- MP6- Attend to precision

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

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Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

☐ Global Awareness
☒ Financial/Economic/Business/Entrepreneurial Literacy
☐ Civic Literacy
☐ Health/Safety Literacy
☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION

Creativity and Innovation
☐ Think Creatively
☒ Work Creatively with Others
☐ Implement Innovations

Critical Thinking and Problem Solving
☒ Reason Effectively
☐ Use Systems Thinking
☒ Make Judgments and Decisions
☒ Solve Problems

Communication and Collaboration
☒ Communicate Clearly
☒ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS

Information Literacy
☒ Access and Evaluate Information
☒ Use and manage Information

Media Literacy
☐ Analyze Media
☐ Create Media Products

Information, Communications and Technology (ICT Literacy)
☐ Apply Technology Effectively

LIFE & CAREER SKILLS

Flexibility and Adaptability
☐ Adapt to Change
☒ Be Flexible

Initiative and Self-Direction
☒ Manage Goals and Time
☒ Work Independently
☒ Be Self-Directed Learners

Social and Cross-Cultural
☒ Interact Effectively with Others
☒ Work Effectively in Diverse Teams

Productivity and Accountability
☒ Manage Projects
☒ Produce Results

Leadership and Responsibility
☒ Guide and Lead Others
☒ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- Tape measures
- Clipboards
- Calculators
- Pen(cil)s
- Paper

Set-Up Required:

- Designate which trees to use for the activity

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Successfully working both independently and with others
- Being creative and flexible
- Making judgments and decisions to solve problems
- Evaluating, managing, and using information

Cooperative Learning:

- Working well with others
- Establishing roles within groups

Expectations:

Connecting formulas to real-world, hands-on learning should lend towards a better understanding of these mathematical concepts

Timeline:

- This activity should work in a 90-minute class period

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Connecting trees to firewood to a financial amount through a group problem-solving mathematical activity seems pretty real

Career Applications

- Logging
- Selling Firewood
- Construction
- Masonry

Optional or Extension Activities

- What if your tree had twice as big of a diameter: How would its worth change?