WAMC Lab Template

Math Concept(s): **Similarity, Right Triangles, and Trigonometry (Apply trigonometry to general triangles)**
Source / Text:
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Attach the following documents:

- Lab Instructions: See attached. Determine the dimension and of the missing side of various right angles within the woodshop
- Student Handout(s)
- Rubric and/or Assessment Tool: See attached

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

Lab Plan

Lab Title: Pythagorean Theorem

Prerequisite skills: Know the formula for the Pythagorean Theorem, imperial and metric measurement, dividers, calipers

Lab objective: The objective of the lab is to help students understand the concept of the Pythagorean Theorem and how it applies to woodworking and construction.

Standards: *(Note SPECIFIC relationship to Science, Technology, and/or Engineering)*
Mathematics K–12 Learning Standards:

- Geometry — Similarity, right triangles, and trigonometry   G-Srt
  - **Define trigonometric ratios and solve problems involving right triangles**
    - Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.★

Standards for Mathematical Practice:
- 1. Make sense of problems and persevere in solving them
- 4. Model with mathematics
- 5. Use appropriate tools strategically
- 6. Attend to precision
- 7. Look for and make use of structure

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):
- Reading Standards for Literacy in Science and Technical Subjects 6–12
  - Craft & Structure: RST —9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.

- o Integration of Knowledge & Ideas: RST — 9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
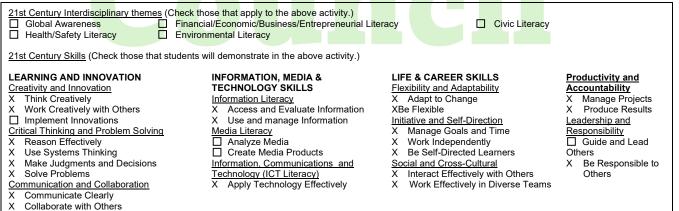-
K-12 Science Standards

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Technology
- **2: Digital Citizen - Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.**
  - o **2.c. Students demonstrate and advocate for an understanding of intellectual property with both print and digital media- including copyright, permission and fair use-by creating a variety of media products that include appropriate citation and attribution elements.**

Engineering

- **HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.**
  - o Mathematics –
  - o **MP.2** Reason abstractly and quantitatively. (HS-ETS1-1),(HS-ETS1-3),(HS-ETS1-4)
  - o **MP.4**) Model with mathematics. (HS-ETS1-1),(HS-ETS1-2),(HS-ETS1-3),(HS-ETS1-4)

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	INFORMATION, MEDIA & TECHNOLOGY SKILLS	LIFE & CAREER SKILLS	Productivity and Accountability
Creativity and Innovation	Information Literacy	Flexibility and Adaptability	
X Think Creatively	X Access and Evaluate Information	X Adapt to Change	X Manage Projects
X Work Creatively with Others	X Use and manage Information	X Be Flexible	X Produce Results
☐ Implement Innovations	Media Literacy	Initiative and Self-Direction	Leadership and Responsibility
Critical Thinking and Problem Solving	☐ Analyze Media	X Manage Goals and Time	☐ Guide and Lead Others
X Reason Effectively	☐ Create Media Products	X Work Independently	
X Use Systems Thinking	Information, Communications and Technology (ICT Literacy)	X Be Self-Directed Learners	X Be Responsible to Others
X Make Judgments and Decisions	X Apply Technology Effectively	Social and Cross-Cultural	
X Solve Problems		X Interact Effectively with Others	
Communication and Collaboration		X Work Effectively in Diverse Teams	
X Communicate Clearly			
X Collaborate with Others			

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

Materials

- Graph paper, pencil, ruler, 25' tape measure, 100' tape, calipers, framers square

Set-Up Required:

- Examples of different woodworking and construction projects that need a specific angle to dimension to be solved.

<u>Lab Organization Strategies:</u>

Leadership (Connect to 21st Century Skills selected):

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Cooperative Learning:

- Students will be grouped in sets of three.

Expectations:

- It is expected that students will grasp an understanding of the Pythagorean Theorem and how it can be applied in woodworking and construction

Timeline:

- This should be a 50 min.

<u>Post Lab Follow-Up/Conclusions:</u>

Discuss real world application of learning from lab

- Career applications for this lab could be woodworking, construction, engineering

Career Applications

- Package design, Industrial design, sheet metal worker, manufacturing

Optional or Extension Activities

- Draw up plans and layout a scale model of a foundation footing

https://wa-appliedmath.org/