WAMC Lab Template

Math Concept(s): Algebra: Pythagorean Theorem
Source / Text: Algebra textbook, guided notes
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Attach the following documents:

- Lab Instructions
- Student Handout(s)
- Rubric and/or Assessment Tool

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

Lab Plan

Lab Title: Find the hypotenuse. Pythagorean Theorem Hunt
Prerequisite skills: Understanding of Pythagorean theorem ($a^2+b^2=c^2$)

Lab objective: Students will be able to find the missing length of a triangle.

Standards: *(Note SPECIFIC relationship to Science, Technology, and/or Engineering)*

Mathematics K–12 Learning Standards:

- Math: HSG-SRT.C.8 Grade 9, Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
- HSG-SRT.B.4 Grade 9, Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*

Standards for Mathematical Practice:

- 4. Model with mathematics
- 5. Use appropriate tools strategically.
- 8. Look for and express regularity in repeated reasoning.

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

- RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- RST.9-10.4 Determine meaning of symbols, key terms, or other domain specific words and phrases as they are used in specific technical context.
- SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners building on others' ideas and expressing their own clearly and persuasively.
- SL.9-10.4 Present information, findings, and supportive evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task

K-12 Science Standards

- HS-PS1-7. Use math to support claims

Technology
- 5. Computational Thinker - Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.

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.

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)
- ☐ Global Awareness
- ☐ Health/Safety Literacy
- ☐ Financial/Economic/Business/Entrepreneurial Literacy
- ☐ Environmental Literacy
- ☐ Civic 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

- Measuring Tape
- Paper
- Pencil

Set-Up Required:

- Provide materials in an accessible location
- Review Pyth Theorem concept.
- Provide formula on the board

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

Cooperative Learning:

- Students will be able to choose to work alone or in groups.
- Students will reason and solve problems.

Expectations:

- It is expected that students will choose their object in the time allowed, and perform the measuring task in order to learn the hypotenuse of the right triange using the Pythagorean theorem.

Timeline:

- This activity will take aproximately 15 minutes to complete with 5 minutes for share out. 20 minutes total.

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Concrete practice will allow students to better retain their learning. Pythagorean Theorem is used in life when calculating shortcuts and measuring distances.

Career Applications

- Ability to know and use the Pythagorean Theorem to find the unknown side of a right triangle enables students to enter a variety of career fields. Mathematician, Engineer, Architect.
- Agriculture

Optional or Extension Activities

- Students have the option to measure more objects, and go back and check their work by measuring the diagnal.
- Students will choose to share their findings to the class.

Pythagorean Theorem Hunt

Today we will adventure around the room to practice using the Pythagorean Theorem with various right triangles. This can be an actual right triangle, but you can also find a right triangle within a square, or a rectangle. You will measure two sides of the shape (length and width) and you will use the Pythagorean Theorem to solve for the hypotenuse.

Reminder: Pythagorean Theorem - $a^2+b^2=c^2$

Directions:
1. Choose your object and draw it on your paper
This can be a right triangle (90' angle) or it can be a square or a rectangle (with 90' angles) that you can make a right triangle with. (For example shape in the carpet, art on the wall, television screen, door, podium, wall segments)

2. Measure the two side angles of your shape (a and b) (length /width, opposite/adjacent)
write these measurements on your paper.

4. Solve!
Use the Pythagorean Theorem (above) to find the hypotenuse using the Pythagorean Theorem (above).

5. Check your work!
Measure the diagonal with your tape measure to check your work.

When you are finished:
-Feel free to practice on another object. You are awesome!!!
-Complete this checklist for completion:

- ❑ Did you draw out your shape and write your measurements down?
- ❑ Did you find the Hypotenuse?
- ❑ Did you check your answer?