WAMC Lab Template

Math Concept(s): Pythagorean Theorem

Source / Text:

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Attach the following documents:

- Lab Instructions: see attached
- Student Handout(s): see attached
- 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 / Stadium Blueprints

Prerequisite skills: Pythagorean Theorem

Lab objective: Students will be able to use Pythagorean Theorem to solve a real-life problem.

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

Mathematics K–12 Learning Standards:

- A8.G.B.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
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Standards for Mathematical Practice:

- MP. 1 Make sense of problems and persevere in solving them.
- MP. 4 Model with mathematics.
- MP. 5 Use appropriate tools strategically.
- MP. 6 Attend to precision.

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

- Collaborative group work.
- Speaking and listening.

K-12 Science Standards

- "using mathematics and computational thinking, engaging in argument from evidence, and obtaining, evaluating, and communicating information; and to use these practices to demonstrate understanding of the core ideas."

Technology

- Students use measurement tape and the calculators to make their calculations.

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
- 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

- Measuring Tape
- Colored paper or popsicle sticks
- Stadium Blueprints

Set-Up Required:

- Group students in groups of four (Use yellow, blue, green, orange(or any other) sticks or paper strips. Ask each students to blind pick their color to form groups). When groups are formed task students to blind pick their roles (Inspector, Construction Manager, Team Member 1, Team Member 2). Task students to read their handouts with directions. Allow 45 minutes to collect all the measurements.

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

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Cooperative Learning:

- Students will be working in groups of four with a random role rotation. Students will present their work from their role perspective.

Expectations:

- It is expected that students will gain an understanding of Pythagorean Theorem.

Timeline:

- This should be an 120 min lab. Launch the lab is 10 minutes, Explore - 45 minutes, Summarize/ Present 65 min to present (8 min each group approximately 8 groups)

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Construction

Career Applications

- Construction

Optional or Extension Activities

- You can task students to solve the triangle fully by using Sine and Cosine properties.

Scenario:
You are the the construction inspector.

Goal:
Your task is to check if the stadium of the school and make sure that it was build as was directed by the blue prints.
Your goal is to supervise the accuracy of all the measurements of the stadium.
The challenge is to find all the measurements including the height of the light polls, gates, etc.
The obstacle to overcome: The only tool you have is a measurement tape and your team.

Role:
You are the construction inspector
You have been asked to inspect the accuracy of the stadium construction.
Your job is to collect all the measurements of the stadium components and compare to the original blue prints.

Audience:
Your clients are the insurance company.
The target audience the constructor crew.
You need to convince the insurance company that the stadium was build according to the blue prints.

Situation:
You will be working with the contractor team and noting all the measurements in blueprints.

Product
You will create a blueprint with all measurements.
You need to develop the presentation to convince the audience that the stadium is safe.

Standards and Criteria for Success:
Your performance needs to be clear, accurate, and precise.
Your work will be judge by the insurance company representatives that will have the original blueprints with all the measurements.
Your product must meet the following:

	4	3	2	1
Presentation	Overall presentation is excellent.	Overall presentation is good.	Seems to not know all the information	Doesn't know all the information.
Visual	All of the measurements are visual on the blueprints	Most of the measurements are visual on the blueprints	Some of the measurements are visual on the blueprints.	Most of the measurements are missing
Acuracy	All of the measurements accurate (less than 10% off)	Most of measurements are accurate (less that 10% off)	Some of the measurements are accurate (less that 10% off)	Most of measurements are missing or more that 10% off

Scenario:
You are a construction manager

Goal:
Your task is to lead your team to measure the stadium of the school and make sure that it was build as was directed by the blue prints.
Your goal is to lead your team to measure all the components of the stadium.
The challenge is to find all the measurements including the height of the light polls, gates, etc.
The obstacle to overcome: The only tool you have is a measurement tape and your team.

Role:
You are the construction manager
You have been asked to measure all the components of the stadium construction.
Your job is to collect all the measurements of the stadium components for the inspector.

Audience:
Your clients are the construction inspector.
The target audience the constructor crew.
You need to convince the insurance company and construction inspector that the stadium was build according to the blue prints.

Situation:
You will be working with the contractor team and construction inspector to measure the stadium components.

Product
You will create a blueprint with all measurements.
You need to develop the presentation to convince the audience that the stadium is safe.

Standards and Criteria for Success:
Your performance needs to be clear, accurate, and precise.
Your work will be judge by the insurance company representatives that will have the original blueprints with all the measurements.
Your product must meet the following:

	4	3	2	1
Presentation	Overall presentation is excellent.	Overall presentation is good.	Seems to not know all the information	Doesn't know all the information.
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Scenario:
You are a construction team member

Goal:
Your task is to measure the stadium of the school and make sure that it was build as was directed by the blue prints.
Your goal is to measure all the components of the stadium.
The challenge is to find all the measurements including the height of the light polls, gates, etc.
The obstacle to overcome: The only tool you have is a measurement tape and your team.

Role:
You are the construction team member
You have been asked to measure all the components of the stadium construction.
Your job is to collect all the measurements of the stadium components.

Audience:
Your clients are the construction inspector.
The target audience the constructor crew.
You need to convince the construction manager, the insurance company, and construction inspector that the stadium was build according to the blue prints.

Situation:
You will be working with the contractor team and construction inspector to measure the stadium components.

Product
You will create a blueprint with all measurements.
You need to develop the presentation to convince the audience that the stadium is safe.

Standards and Criteria for Success:
Your performance needs to be clear, accurate, and precise.
Your work will be judge by the insurance company representatives that will have the original blueprints with all the measurements.
Your product must meet the following:

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Presentation	Overall presentation is excellent.	Overall presentation is good.	Seems to not know all the information	Doesn't know all the information.
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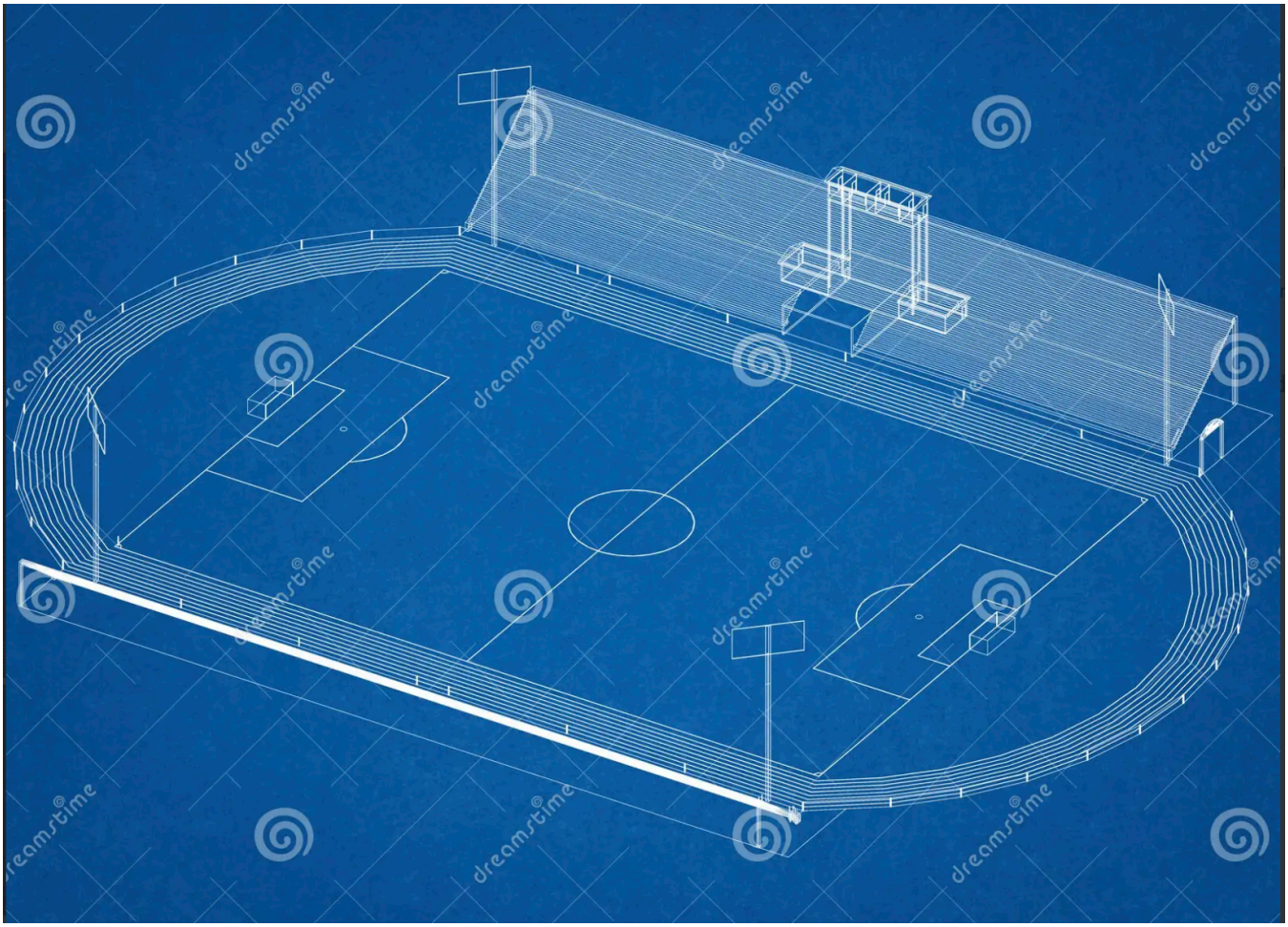

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