

WAMC Lab Template

Math Concept(s): measurements, Geometry

Source / Text:

Developed by: Kefa Cummings

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Date: June 22, 2022

Attach the following documents:

- Lab Instructions
 - Get into Table Teams, 3 - 4 students per
 - Each Team is to build the tallest, freestanding Tower from the tabletop, using only the supplied materials (not secured or supported from anything above)
 - Marshmallow needs to be at the top of the structure. This is the height that the tower will be measured
- Student Handout(s)
 - 15 sticks of spaghetti, 3' of tape, 3' of string, 1 marshmallow
- Rubric and/or Assessment Tool
 - Tape measure to measure the height from the tabletop to the marshmallow on top of structure

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

Lab Plan

Lab Title: Spaghetti Tower

Prerequisite skills:

Understanding gravity, assembling items, working with others

Lab objective:

To be able to work as a team to create a freestanding tower using the materials provided.

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

Mathematics K–12 Learning Standards:

Apply geometric methods to solve design problems

Use geometric shapes, their measures, and their properties to describe objects

Standards for Mathematical Practice:

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Use appropriate tools strategically.

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

- <http://www.corestandards.org/ELA-Literacy/SL/9-10/1/>
- <http://www.corestandards.org/ELA-Literacy/SL/9-10/4/>
- <http://www.corestandards.org/ELA-Literacy/SL/11-12/4/>
- <http://www.corestandards.org/ELA-Literacy/SL/11-12/1/b/>

K-12 Science Standards

Technology

Engineering

Leadership/21st Century Skills:

<p><u>21st Century Interdisciplinary themes</u> (Check those that apply to the above activity.)</p> <input type="checkbox"/> Global Awareness <input type="checkbox"/> Financial/Economic/Business/Entrepreneurial Literacy <input type="checkbox"/> Civic Literacy <input type="checkbox"/> Health/Safety Literacy <input type="checkbox"/> Environmental Literacy			
<p><u>21st Century Skills</u> (Check those that students will demonstrate in the above activity.)</p>			
<p>LEARNING AND INNOVATION</p> <p><u>Creativity and Innovation</u></p> <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input checked="" type="checkbox"/> Implement Innovations <p><u>Critical Thinking and Problem Solving</u></p> <input checked="" type="checkbox"/> Reason Effectively <input checked="" type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgments and Decisions <input checked="" type="checkbox"/> Solve Problems <p><u>Communication and Collaboration</u></p> <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	<p>INFORMATION, MEDIA & TECHNOLOGY SKILLS</p> <p><u>Information Literacy</u></p> <input checked="" type="checkbox"/> Access and Evaluate Information <input checked="" type="checkbox"/> Use and manage Information <p><u>Media Literacy</u></p> <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products <p><u>Information, Communications and Technology (ICT Literacy)</u></p> <input type="checkbox"/> Apply Technology Effectively	<p>LIFE & CAREER SKILLS</p> <p><u>Flexibility and Adaptability</u></p> <input checked="" type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible <p><u>Initiative and Self-Direction</u></p> <input checked="" type="checkbox"/> Manage Goals and Time <input type="checkbox"/> Work Independently <input type="checkbox"/> Be Self-Directed Learners <p><u>Social and Cross-Cultural</u></p> <input checked="" type="checkbox"/> Interact Effectively with Others <input checked="" type="checkbox"/> Work Effectively in Diverse Teams	<p>Productivity and Accountability</p> <input type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results <p>Leadership and Responsibility</p> <input checked="" type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

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

Materials

- 15 Spaghetti sticks per table group
- String, tape, marshmallow per table group

Set-Up Required:

- None

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Students will contribute their ideas to the group and work together to build a tower.

Cooperative Learning:

- Students will then work as a group collaboratively to complete the project
- The ability to brainstorm ideas as a group

Expectations:

Students will work together to build the tallest spaghetti tower they can with the materials provided

Timeline:

- One class session

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- To have an understanding of building from ideas

Career Applications

- Construction Trades, Architect

Optional or Extension Activities

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WAMC Lesson Plan

Name(s): Kepa Cummings

Email Address: kepa.cummings@highlineschools.org

Lesson Title: Spaghetti Tower Build

Date: June 22, 2022

Text: Geometry, Algebra

STEM Correlation: Engineering, Building

Lesson Length: 50 minutes (inc lab work)

Big Idea (Cluster): Build the tallest, freestanding structure from the table top

Mathematics K–12 Learning Standards:

Apply geometric methods to solve design problems

Use geometric shapes, their measures, and their properties to describe objects

Mathematical Practice(s):

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Use appropriate tools strategically.

Content Objectives: Students will be able to work with others to build the tallest tower using only the materials provided

Language Objectives (ELL): Students should be able to communicate and work with others to complete the task.

Vocabulary: height, spaghetti tower, communicate, marshmallow,

Connections to Prior Learning

- To be able to work in a group
- To think outside the box

Questions to Develop Mathematical Thinking:

- How big do we have to make it?
- Can we break items into smaller pieces?
- How can I get it to angle up?

Common Misconceptions:

- Make it as big as you can
- You can break the pieces into whatever size you need them
- Think about how to get it to angle upwards

Assessment (Formative and Summative):

- Formative: making use of all the materials given
- Summative: successful completion of project

Materials:

- Spaghetti
- Tape
- String
- Marshmallow
- Tape measure

Instruction Plan:

Introduction: I will explain the project to the students and what they will be doing. I then need to tell them the rules of the project and make sure they understand. I will have one student from each table group come up front and get their materials to build their tower.

Explore:

WAMC Lesson Plan

Students will begin to work as a team, coming up with ideas, brainstorming before beginning their build. They will then start to build their tower.

When I observe students:

Walking around the room, answering questions they have and just observing how they are working together.

Questions to Develop Mathematical Thinking as you observe:

Answers:

Summarize: Students will have collaborated with their team and worked together on building the tallest tower they could

Career Application(s):

- Working with others and communicating
- Engineering
- Building and Construction

Leadership/21st Century Skills:

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

- | | | |
|---|---|---|
| <input type="checkbox"/> Global Awareness | <input type="checkbox"/> Financial/Economic/Business/Entrepreneurial Literacy | <input type="checkbox"/> Civic Literacy |
| <input type="checkbox"/> Health/Safety Literacy | <input type="checkbox"/> Environmental Literacy | |

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

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