

stEm

Title: Building a Structure (Lesson A-D)

Grade Level: Kindergarten

Duration: Four 45 minute Inquiry Mondays



<p>Objective: Students will follow the steps of the design process and perform the role of an engineer in completing a task.</p>	<p>Focus Concept/s: How to follow the design process to build a structure.</p>
<p>Essential Question/s: How tall can you build a tower using 15 index cards and 30 paper cups?</p>	<p>Connected Benchmark/s SC.K.N.1.1 – Collaborate with a partner to collect information.</p>
<p>Vocabulary: Structural Engineer</p>	<p>Suggested Materials: 15 index cards per pair 30 small paper cups per pair (bathroom size Dixie cups or smaller)</p>
<p><u>Problem/Challenge (Engage): (1st Monday)</u> Logon to Myon.com – read the book: <u>Rapunzel (a retelling of Grimms’Fairy Tale)</u></p> <p><u>Student task:</u> Teams of engineers will create the tallest tower.</p> <p><u>Student Scenario:</u> Rapunzel was stuck in the top of the tower. Your team of engineers will need to build a model of the tower that Rapunzel was in. Your task is to build the tallest tower with the materials that you are given.</p> <p>Present students with the Request for Proposal.(attached)</p>	
<p><u>Brainstorm/Investigate (Focus Concepts): (1st Monday)</u> Students work as teams of engineers to discuss and plan how they will build their tower. Note: Have students think about what is important to build a tall tower that will not topple over (students may need background on foundations.) It is recommended to build background knowledge by presenting examples of pictures or photographs of towers such as the Eiffel Tower or others.</p>	
<p><u>Plan/Design (Blueprint): (2nd Monday)</u> Students work in their groups to sketch out their plans for building their tower. They will create a blueprint of the tower.</p>	

Build/Test: (Lesson B)and (Third Monday)

Students work in groups to build their towers using the blueprint that they created. As they build, they should make revisions to their blueprints to show any changes that they would like to make in their design to make it even taller using the same materials.

Collect/Analyze Data: (Third Monday)

Students measure their towers and record their measurements on the blueprint. How could the tower have been taller? What changes would you make?

Reflect on Improvements: (Third and Fourth Monday)

Students reflect on what they originally designed and the changes that they made as they tested their design. What worked? What would you have done differently? If time permits, have students rebuild to test the changes that are made to the designs.

Evaluate/Justify: (Fourth Monday)

Students now reflect on what they have done during the design process of their towers. What other materials would you have liked to use?

Introduce Structural Engineers (copy of career definition on following page) Have students add the career definition to their science notebooks. Students can draw and write what they have learned about what structural engineers do for our world.

Becoming a Structural Engineer....



Structural Engineering is the study of how to make build things so they are strong and don't break easily. You probably don't stop to worry about whether the building you are in right now can withstand a force of nature like a hurricane or an earthquake. But if you were a structural engineer, you'd design and plan houses, schools, bridges, and skyscrapers to resist these powerful forces.

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Request for Proposal

Proposal must be submitted as a model.

The Fairy Tale Engineering Department is requesting proposals for a solution that will prevent the witch from finding Rapunzel and her Prince.

Engineers will develop a model of the tallest tower that they can make.

As a structural engineer you want to make sure your design will be strong and will remain stable. Some things to think about:

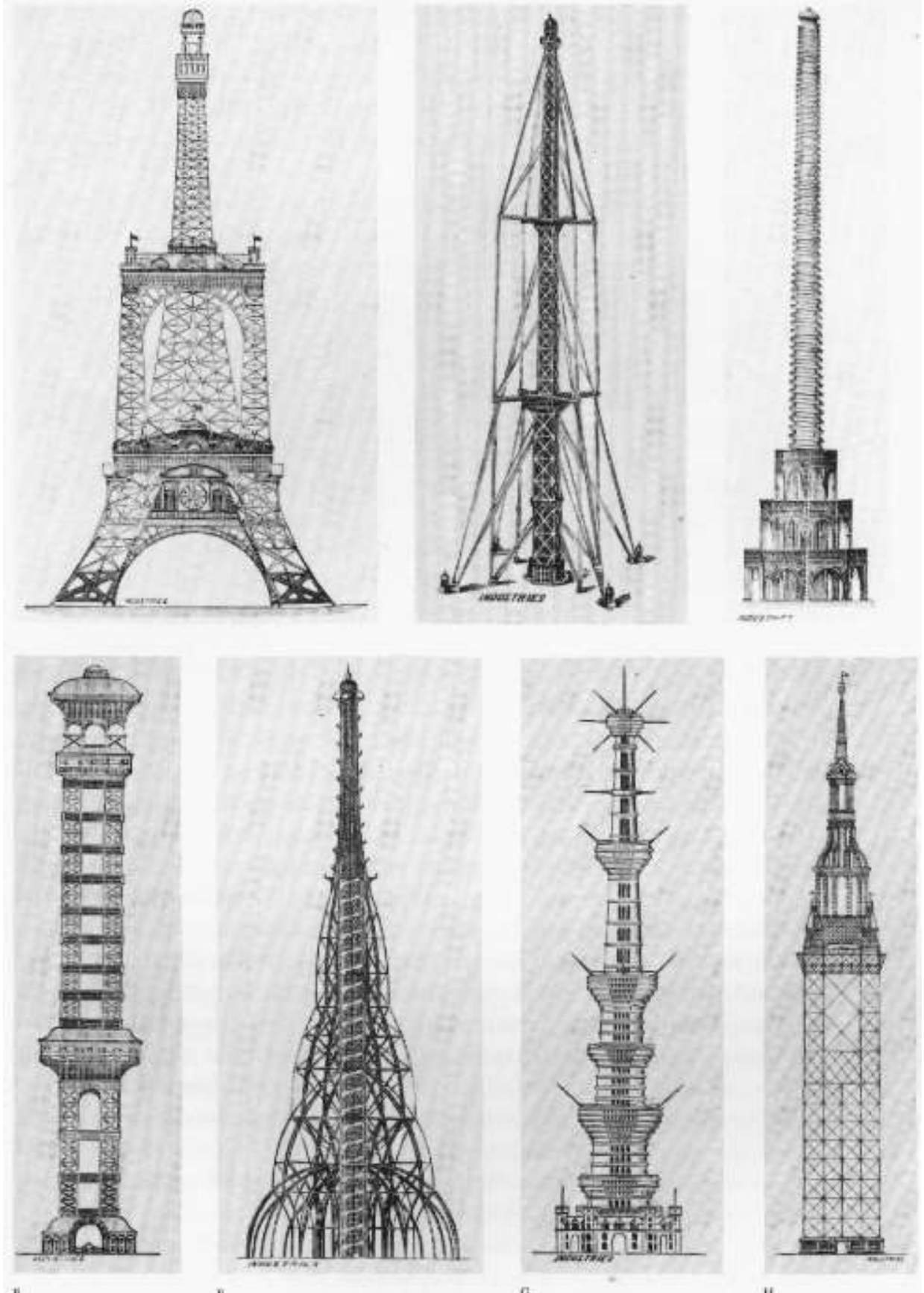
- What kind of foundation will it need?
- The source of materials that your design requires

Item Specifications: All towers must be created using only 15 index cards and 30 paper cups per team of engineers.

Engineering teams will create a prototype of their product to present to the Project Manager (your teacher).

Blueprint must be drawn.

Will your engineering team help Rapunzel and her Prince live happily ever after?



Engineer _____

Teacher: Provide one copy of this page for each student or use student notebooks for planning. (Day 1)



Design Challenge Planning Sheet

Problem/Challenge:

Investigate/Brainstorm: *Draft possible solutions.*

A.

B.

Select the solution you plan to build. What are the strengths and weaknesses of your design? How will it help you complete your proposal?

Teacher: Model using this page. Students will complete this page in teams in future Challenges

Plan/Design: Sketch your blueprint & label the parts.



Build/Test: Build and then test your design.

Collect and Analyze Data:

Data Chart	
Trial 1	
Trial 2	
Trial 3	
Trial 4	
Trial 5	

Reflect /Improve: What could we have done to make our design better?

Evaluate and Justify: Share your design with the class and explain why you think it is the best design.