PASTA TOWER CHALLENGE

ENTRIES OPEN MARCH 14, 2019 - JULY 11, 2019

LESSON PLAN

BUILD & ITERATE

It's build time! Students will build, evaluate and refine their pasta tower.

FOR THE CLASSROOM

POSSIBLE APPROACH FOR THE CLASSROOM

LESSON LENGTH
1, 30-40 MINUTES

OBJECTIVE
BUILD YOUR PASTA TOWER

MATERIALS
SEE BELOW

VOCABULARY:

- Engineering design process
- Structural Engineering

MATERIALS

BUILD

- Spaghetti (50 pieces per tower)
- Mini Marshmallows (30 marshmallows per tower)

DOCUMENTATION & SUBMISSION

- Camera Device (any kind - ipad, mobile, camera)
- Computer
- Internet
- Access to CONTEST RULES and DESIGN GUIDELINES

PROCEDURE

1. DOWNLOAD AND TEACH THE BUILD & ITERATE POWERPOINT: We have provided a Future Engineers PPT. Feel free to customize it to suit your teaching needs.

2. BUILD

a. Review design guidelines.

b. Pass out 50 pieces of spaghetti and 30 minimarshmallows for each tower. Group submissions of up to 4 students are allowed.

c. Give your students time for their build.

d. Assist in a 5-10 minute peer review session by having the students answer the following questions about other groups build.

What do you think will work well with their design?

What suggestions do you have for them to make their design better

e. Give the students additional time to refine their builds

f. Take up to 6 photos (3MB max per image) of your tower for submission. (NO FACES! NO NAMES!)

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BACKGROUND INFORMATION

STRUCTURAL ENGINEERING

If you want to build or repair a building, you sometimes need a structural engineer. Structural engineering is the branch of engineering involved in the design, construction or repair of structures. They often act as consultants to the architects and contractors throughout the project.

ENGINEERING DESIGN PROCESS

The engineering design process is a series of steps used to solve problems, and innovate/engineering new creations. Some define it with more steps than others, but at the core a process where students ask the right questions, use creativity to brainstorm ideas, use design skills to create the plan/design, get hands-on to build a solution, and then iterate, test and refine. Your students are already mid-journey, but here are some steps to explain the steps to your students.

ASK

Engineers must ask questions about the problem they want to solve. What is the goal? What are we trying to solve? What have others done in the past?

RESEARCH

Research includes looking up information that will help you solve your problem or reach your goal. You also examine what materials and resources are available to use. You can also look at what has been done and the mistakes that have been made. Notes are taken on all these things so new possibilities can be imagined.

BRAINSTORM

Work with a team to come up with as many possible ideas and solutions as possible. All ideas are good ones and creativity is highly encouraged.

DESIGN

Take your research and brainstorming ideas and come up with a plan or design. Be sure to consider the design constraints.

BUILD

Build out your design. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

TEST & EVALUATE

Test out your design and see if your build worked. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

IMPROVE (ITERATE)

Use what you learned in your testing to make a better version of your solution. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

NEXT GENERATION SCIENCE STANDARDS

MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed, object, tool or process such that an optimal design can be achieved.

MS-PS2-2 Motion & Stability: Plan an investigation to provide evidence that the change of an object's motion depends on the sum of the forces on the object and the mass of the object. [Clarification Statement: Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference, and specification of units.]