

STEM: ENGINEERING + SNACK

In this STEM Activity Lesson, students will use their fine motor skills to engineer and build a structure from different snack items. This is a fun engineering activity that combines building and creativity skills with a fun snack. This is a great activity to encourage an engineering mindset and grow student's fine motor skills.

NEXT GENERATION SCIENCE STANDARDS

The Next Generation Science Standards (NGSS) are a comprehensive guide for K – 12 STEM science content standards. The Framework lays out the STEM skills young people should have as they move through the K – 12 school system. This STEM Activity Lesson is designed to integrate the Next Generation Science Standards. For more information and to find all of the standards visit: <https://www.nextgenscience.org/>

NGSS FOR THIS ACTIVITY LESSON

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems	ETS1.A: Defining and Delimiting Engineering Problems	Influence of Science, Engineering, and Technology on Society and the Natural World
Developing and Using Models	ETS1.B: Developing Possible Solutions	
Engaging in Argument from Evidence	ETS1.C: Optimizing the Design Solution	

*To see the full standard visit: <http://www.nextgenscience.org/topic-arrangement/msengineering-design>

BIG IDEAS

WHAT IS ENGINEERING?

- Engineering is the branch of science and technology concerned with the design, building, and use of engines, machines, and structures. Engineers are the mind behind the design of things like towers, building, trains, etc. Engineering provides an opportunity to teach kids how to work together and solve problems at a young age.

WHO CAN BE AN ENGINEER?

- Anyone! Engineering is elementary and when given the time to experience engineering, design, and technology, they will begin to put their ideas to a real world test. A huge part of design and engineering is problem solving skills, which students will need later in life whether they become a structural engineer, a teacher, or a lawyer! There are many different types of engineering, so many that anyone could find a branch that they would be interested in:
 - Aerospace Engineering
 - Agricultural Engineering
 - Automotive Engineering
 - Biological Engineering
 - Biomedical Engineering
 - Building Engineering
 - Chemical Engineering
 - Civil Engineering
 - Computer Engineering
 - Construction Engineering
 - Electrical Engineering
 - Engineering Chemistry
 - Food Engineering
 - Gas Engineering
 - Geological Engineering
 - Industrial Engineering
 - Mechanical Engineering
 - Plastics Engineering
 - Software Engineering
 - Water Resource Engineering
 - And there are many more to add to this list!

SUPPLIES & PREPARATION

SUPPLIES

- Toothpicks, pretzel sticks, uncooked spaghetti noodles
- Any of the following snack items to join the toothpicks:
 - banana slices
 - chopped apples
 - grapes (whole or halved)
 - chopped pineapple, watermelon, cantaloupe, etc.
 - cheese cubes
 - marshmallows
 - Jelly beans
 - Gum drops
- Book for the experiment portion of the activity

**I would suggest using toothpicks in this activity, but you will need to warn the children about the sharp points on the toothpicks. If you are working with younger kids or are worried about them using toothpicks, pretzel sticks or uncooked spaghetti noodles (cut in to smaller pieces) are great alternatives.

**This activity should be tailored to fit what supplies you have on hand, are easy to obtain, or that you can have donated. If all you have on hand are gumdrops and spaghetti noodles, allow them to also use tape and have them create the tallest structure they can. Or, if you only have marshmallows and toothpicks, challenge the students to make the most unique structure that stands tall.

PREPARATION

- Chop/slice any of the fruits or vegetables that will be used (i.e., bananas, apples, carrots, grapes, etc.)
- Put all of the food items in to small cups or bowls
- Put the toothpicks, pretzels, uncooked spaghetti noodles in a central location
- Have a plate or work space for each student to build on

ENGAGE THE STUDENTS

1. What is engineering?
2. How do you think engineering will come in to effect while building your snack tower?
3. Which snacks do you think will be the best to build with?
4. Do you think that pretzel sticks or toothpicks will work best when building the structure?

EXPLORE & EXPERIMENT

1. Put all of the snack items in separate bowls/cups in reach of the kids, do the same with the toothpicks/pretzels/etc.
2. Start by showing the students how to connect 2 of the toothpicks, having them copy what you are making
3. Then have everyone make a square, using any of the snack items provided; next, a triangle, rectangle, etc.
4. Once the children are comfortable connecting toothpicks and see how to make shapes, encourage them to build a tower, house, castle, or whatever kind of structure they wish!
 - a. It would be a good idea to have some pre-made structures to give the children some ideas of what to make
 - b. As the students are playing with the materials and building, discuss the pros and cons of each building material (i.e. the bananas are slippery, the grapes are too squishy)

EXPERIMENT TIME!

1. Break the students in to groups of 3 – 5 and assign each group one a “joining material” and toothpicks
 - a. Marshmallows
 - b. Cheese cubes
 - c. Jelly beans
2. Give each group 20 – 30 minutes to plan, design, and build a tower out of the materials given
 - a. Tell the students that the tower they build must be at least 12 inches in height and can look any way that the group wishes
3. The test of the tower will be placing a book on the top
 - a. Use the same book for every group’s tower

CONNECT & EXTEND

- What kind of structure did you build while exploring the materials? (house, castle, etc.)
- Which snacks did you use the most of? Why?
- What other food items could you use to build your structure?

- Allow the students to really discuss why their structure did or did not stand with the weight of the book.
 - The student should engage in an argument based on the evidence from their experiment as to why or why not
 - They should evaluate their design plan and discuss how it could have been improved
- Which of the snacks made the strongest structure?
- Which group's tower held up the best to the book?
- What was the hardest part of designing a tower that would hold the weight of the book?
- How important was the base of your structure?
- Did the height requirement affect how you built your tower?
- What would you now change about how you built your tower?

REFERENCES

Draxler, B. (2013). Teaching kids to think like engineers. *Discover*. Retrieved on August 2, 2018, from <http://discovermagazine.com/2013/dec/15-e-is-for-engineering>

Julie (2016). Engineering with food: Preschool STEM. *My Mundane & Miraculous Life*. Retrieved on April 17, 2018, from <https://www.mymundaneandmiraculouslife.com/engineering-food-preschool-stem/>