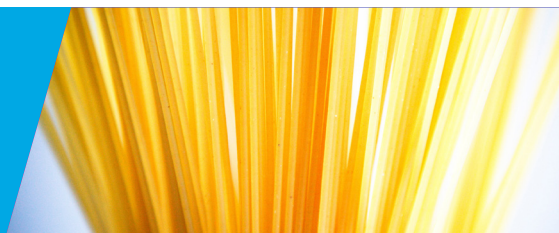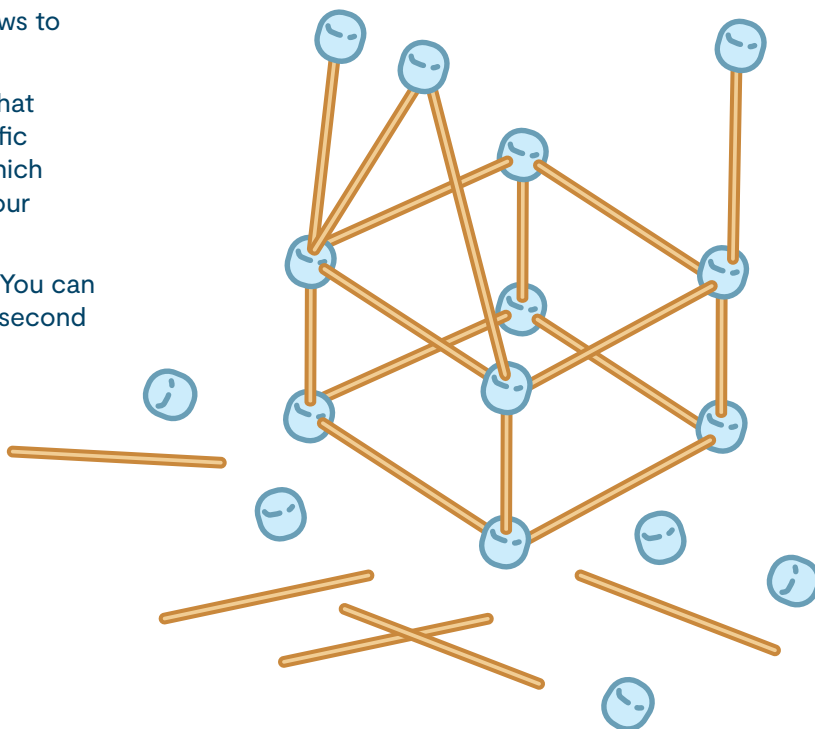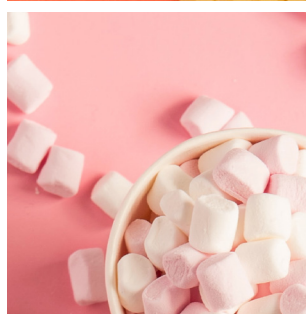# CURIOSITY AT HOME

SPAGHETTI TOWERS

Explore shape and structure in this engineering activity. Using spaghetti and mini marshmallows for construction, you will design, build, and redesign the tallest tower possible!

MATERIALS

· Dry spaghetti noodles

· Mini marshmallows or tape

· Science notebook or paper

· Something to write with

PROCEDURE

· First, use your science notebook or paper to design a tower structure. You can start with a simple design or be ambitious with something complicated! See the following page for some real-life towers to use as inspiration.

· Using the noodles and marshmallows, construct your tower. Remember that you can break the spaghetti pieces into any size. (Tape can be used in place of marshmallows to connect spaghetti pieces.)

· After your first attempt, assess how things went. What challenges did you encounter? Did you use a specific shape? Which shapes were easier to create, and which were the strongest? Record your observations in your science notebook.

· Based on your results, modify your original design. You can take apart your first tower and try again, or build a second one to be able to compare.

· Continue to design, test, and redesign!

*Experiment continued on next page...*

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EXPLORE MORE

Once you're satisfied with your tower, put it to the test to see if it can hold any weight. Can a figurine or small stuffed animal sit at the top of your tower? Adjust your design and see how much weight it can hold before it collapses!

WHAT'S HAPPENING?

Triangles are the building blocks of many structures mainly because of their ability to bear large loads without losing their shape. When pressure or weight is applied to any side of a triangle, this weight is evenly distributed by all sides and because the sides cannot change length, the shape remains stable. When the same happens to another shape, like a square, the joints can bend without the length of the beam changing, leading to the collapse of the shape.

Because of these geometrical properties, triangles are used to build strong structures such as bridges and trusses. A truss is a simple set of triangles sharing sides, and connections. The properties of each triangle are kept and form an even stronger structure.
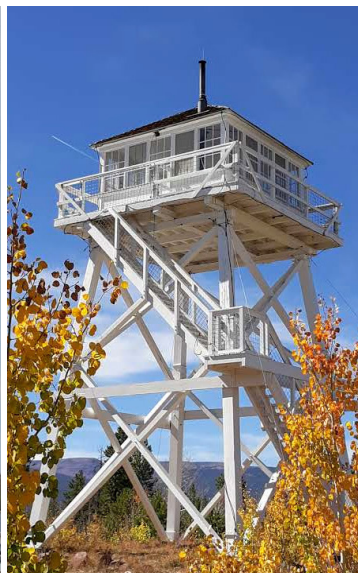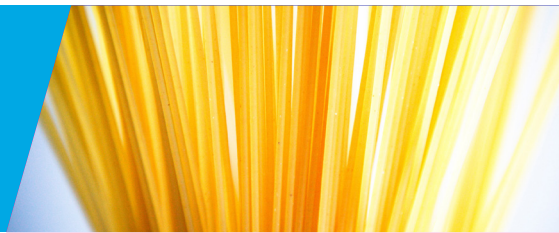
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K–2 GRADE EXPLORATION

Here are some questions you can explore together:

· Did you use long or short spaghetti pieces in your design? Which seemed to be stronger?

· How many marshmallows did you use?

· What towers have you seen in real life? What about in books or movies? How do they compare with the tower you built?

· What else could you build using the same materials?

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3–5 GRADE EXPLORATION

Explore the following questions and record your answers in your science notebook.

· How closely does your tower match your original design?

· What things did you change when you adjusted your original design? Did you use different shapes? Different lengths of spaghetti? A different number of marshmallows?

· What do humans use towers for? What examples of real-life towers can you think of? Consider structures you have seen in real life, books, or movies.

· Challenge another member of your household to a tower-building contest. Set a length of time and see who can build the tallest tower!

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6–8 GRADE EXPLORATION

Explore the following questions and record your answers in your science notebook.

· What is the most common shape used in your tower design?

· How does your final tower compare with your original design? What adjustments did you make and how did they affect height and stability?

ADDITIONAL CHALLENGES

· Use a limited number of materials. For example, how tall of a tower can you build using only 5 sticks of spaghetti and 8 marshmallows?

· Build a structure using only triangles in your design.

· Time yourself: How tall of a tower can you build in just one minute?

· Compete against another member of your household. Set a length of time and see who can build the tallest tower.

· Build two towers and connect them with a bridge.

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