

S'more Science

ADD S'MORE SCIENCE INTO YOUR SUMMER

Warm summer nights are great for gathering around a fire and roasting s'mores. Put a twist on the classic with this this delicious science experiment!

HOW IT WORKS

In this activity, learners will make s'mores using waffle cones and ingredients of their choosing. They will predict and observe how the heat and insulation of the cooking process transforms their cone into a melty, gooey, snack. Then, they will enjoy the results! This activity is fit for learners of all ages.

Background information can be found at the end of this guide.



PROCEDURE

1. Start by gathering around the campfire (or oven) and observing what happens when you place a single marshmallow into the heat.
 - a. What do you notice happening to the marshmallow?
 - b. Why do you think it is reacting that way?
 - c. What do you think a marshmallow is made of that causes it to look/move/react like that?
2. After making observations, pass out waffle cones and fill them with ingredients of your choice!
3. Make a few different cones. Fill one with classic ingredients, then experiment with different flavors, textures, and layers in the rest.
4. Once assembled, wrap it with foil.
5. Place them in the coals of a campfire and let it cook for about 5 to 7 minutes.
 - a. If using the oven, bake them for 5 to 7 minutes at 400 degrees Fahrenheit.
6. While they're cooking, make some predictions about your cones:
 - a. What do you think the texture of each will be like?
 - b. Which kinds of flavors do you think we will taste?
 - c. What do you think is happening on the inside of the waffle cones?
 - d. How might the fire change them? Do you think it's similar or different to the marshmallow earlier?
7. Once they're done cooking, remove them from the heat and let cool for about a minute.



INGREDIENTS

- Waffle cones
- Mini marshmallows
- Chocolate
- Graham crackers
- Your choice of toppings, chopped into small pieces
 - Chocolate candies, candy bars, nuts, sprinkles, popcorn, peanut butter cups, coconut, fresh fruit, etc.

MATERIALS

- Foil
- Camp fire or oven
- Bowls for toppings

SAFETY

Adult supervision is recommended. Precautions should be taken to avoid heat from fire and/or oven.

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8. Carefully remove from the foil and make some observations of your results:
 - a. Does it look the same or different from how it was before?
 - b. What do you notice about it now?
 - c. Where else have you seen something melt like this in the kitchen? What other ingredients melt and become gooey like marshmallows do?
9. Finally, enjoy the results of your experiment!

EXTENSION ACTIVITIES

BURNIN UP

Investigate how heat breaks down each ingredient, individually. Place one piece of each ingredient directly into the fire/heat and watch what happens. Compare how they react to the heat. Do they melt, or do they burn? Which react faster and which react slower? Do they all react the same way?

FLAVORTOWN

Continue making new flavor combinations! Try adding cool ingredients, such as ice cream, to your cone and see how it melts. Try adding hard ingredients, such as hard candies, to see if they break down during the cooking process. Can you make a savory (or salty) s'more? Think outside of the box!

FEELIN HOT

Make two identical waffle cones and place them in the heat for different amounts of time. Compare the results of the two. Does the amount of time spent in the fire affect how it cooks on the inside? What do you think is the perfect roasting time for your s'mores?

LOOKING FOR S'MORE ACTIVITIES TO DO?

Check out the Learning Launchpad on Chabot Space and Science Center's website!
Discover more at-home, hands-on, science activities and experiments to do throughout the summer.

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WHAT IS A MARSHMALLOW, EXACTLY?

Marshmallows are quite the confectionary concoction. They are usually made with some combination of sugar, water, and gelatin. The ingredients are heated then vigorously whipped together. During the whipping process, tiny air bubbles form, getting trapped within the mixture. These air bubbles are extremely important! They are what give the marshmallow their squishy, airy, springy consistency. It is gelatin's job to hold these air bubbles in. Gelatin is an animal-based binder that increases elasticity, squishiness, and rigidity of marshmallows. By adding it in to the marshmallow mix, it allows the sugar to hold its shape, and retain its newly incorporated air bubbles! Marshmallows can be made at home using a variety of ingredients; including as corn-syrup, egg whites, simple syrup, and cornstarch. Cooking and experimenting with recipes is its own science, one that many pastry chefs and dessert connoisseurs have been working with for years to create the perfect marshmallow!



HEAT, INSULATION, AND REACTIONS

Making s'mores is a great way to highlight heat transfer and heat reactions! When a s'more waffle cone is placed into a fire, heat (or energy) is transferred from the fire to the waffle cone. The additional heat raises the temperature, which can cause the ingredients inside to react and transform. As the temperature rises above a certain threshold, ingredients inside reach their melting point. Those that begun as solid ingredients begin to break down into less-than-solid states. This is why the ingredients begin to melt, mix, and become gooey! Adding foil around the waffle cones helps with the heating and melting process. Aluminum foil contains metal and therefore, acts as an insulator. This means it helps trap heat closer around the waffle cone, distributing the heat more evenly. Even though s'mores may seem like a simple, summer activity, they involve a lot of science that goes unseen.

