



MENSA® FOUNDATION

Educational Programs

The Science of Candy!

Overview

This series of educational programs was designed to simultaneously entertain and challenge gifted youth in their time outside of the school setting; however, the activities may be easily shared and enjoyed by older people as well. Programs may be scaled up or down depending on number of attendees, desired level of complexity, etc. Sample materials are included with most plans.

The Educational Programs series was developed by Lisa Van Gemert, M.Ed.T., Gifted Youth Specialist for the Mensa Foundation. If you have questions or comments about these programs, please email GiftedYouth@mensafoundation.org.



Introduction

Candy is for more than snacking! Explore ways to use candy to learn more about science and the world around you. Our sweet ideas include:

- blowing up a balloon without air
- testing the acid content of candy
- chromatography
- making a cake-and-candy model of an animal cell

Supplies

- 2 bottles of soda (any will work; use 16- or 20-ounce bottles)
- 1 package Pop Rocks® candy
- 2 tablespoons of baking soda
- Funnel
- A piece of string or yarn
- 2 balloons (9-inch balloons work well)
- Fruit-flavored or sour candy, such as Lemonheads®, Nerds®, WarHeads®, or sour gummy candy. You can also try Skittles®, SweetTarts®, Starburst®, or Pixy Stix®.
- Baking soda
- Water
- Cup, bowl, or measuring cup
- Coffee filter, white napkin, or white paper towel



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- Candy that has been dyed (M&Ms®, Skittles®, or Reese's® Pieces® work well)
- Hard, flat surface (plate, cutting board, cookie sheet, etc.)
- Pencil
- Frosted cake
- Assorted candies



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The Science of Candy!

Select the activities you would like to do and gather the supplies.



Blowing Up a Balloon without Air!

Although we typically think of blowing up a balloon with our breath (or a helium pump), here are two ways to make a balloon expand without using your breath or a pump.

Materials

- 2 bottles of soda (any will work; use 16- or 20-ounce bottles)
- 1 package Pop Rocks® candy
- 2 tablespoons of baking soda
- Funnel
- A piece of string or yarn
- 2 balloons (9-inch balloons work well)

Directions

- Using the funnel, fill an uninflated balloon with a package of Pop Rocks.
- Stretch the opening of the balloon over the mouth of a bottle of soda.
- Dump the contents of the balloon into the soda.
- Use a piece of string or yarn to measure the expansion of the balloon.

Notes

- Pop Rocks® start out like any other candy – sugar that is heated up. What they do differently to Pop Rocks is add a lot of carbon dioxide to the heated mixture under high pressure. When you crush or dissolve the Pop Rocks (in your mouth, by grinding, or by dissolving in soda or water), you release the carbon dioxide (that's what makes the popping sound in your mouth).
- When you mix Pop Rocks with soda, the carbon dioxide in both the soda and the Pop Rocks is released. There is actually quite a bit more carbon dioxide in the soda than in the Pop Rocks – nearly ten times as much!
- Repeat the experiment with the baking soda.
- Use string or yarn to measure the expansion of the balloon. Does it expand more or less with the baking soda than the Pop Rocks?
- What do you think would happen if you put both Pop Rocks *and* baking soda in the bottle?





Testing Acid Content of Candy

Sour taste is the body’s way of identifying acid, so if you taste sour candy, you can hypothesize that your candy has acid. But you don’t have to just trust your tongue! Science can prove what your tongue is telling you.

Materials

- Fruit-flavored or sour candy, such as Lemonheads®, Nerds®, WarHeads®, or sour gummy candy. You can also try Skittles®, SweetTarts®, Starburst®, or Pixy Stix®.
- Baking soda
- Water
- Cup, bowl, or measuring cup

Directions

- Pour a small amount of water into the cup, bowl, or measuring cup.
- Place the candy you are testing in the water. Only use one type of candy at a time.
- Now, add about a spoonful of baking soda to the candy and water.
- Observe.
- If bubbles form, there is acid present in the candy. The greater the amount of bubbles, the greater the acid content of the candy.

Notes

- Carbon dioxide gas is being produced from the acid in the candy and baking soda, producing bubbles.
- If you would like to conduct a simple (and yummy) science project, use the table below to record your observations.

Candy	Observation (amount of bubbles)	Acid Content of Candy (low, medium, high)



Chromatography

Candy makers use dyes to create colorful candy. But what you see isn't always what you are getting. You can test the true colors in candy with this simple experiment.



Materials

- Coffee filter, white napkin, or white paper towel
- Candy that has been dyed (M&Ms®, Skittles®, or Reese's® Pieces® work well)
- Hard, flat surface (plate, cutting board, cookie sheet, etc.)
- Pencil

Directions

- Carefully place a few drops of water on the flat surface.
- Add some candy and allow the color to dissolve.
- You may test as many colors as you like, but be sure to only use one color of candy in each water puddle.
- Dip the edge of the coffee filter (or paper towel or napkin) into the colored water. It works best if you fold the paper so that you can dip an inch or so from the edge.
- Record which color you are testing on each piece of paper.
- It is very important that you follow these directions carefully: Place the paper in the cup with the edge of the paper touching the water and the colored area above it.
- Fold the top of the paper over the edge of the glass to keep it in place, or clip it to the edge with a clothespin.
- The water will rise through the paper, and when it reaches the colored dot, the dye within the candy will separate so that you can observe which colors were in the candy.

Notes

As the water travels through the paper, it will separate the different colors of dye. Some colors contain more colors than others. You may repeat this experiment with marker or even juice!



Floating Letters

Materials

- Glass of water (warm water sometimes works better than cold)
- M&Ms® or Skittles®

Directions

- Drop the candy into the water, being careful to keep the letter side upright. Do *not* stir the water at all.
- After a few minutes, observe the top of the water. Do you see any letters floating?
- Be sure to use at eight candies to make sure you get some letters!

Notes

M&Ms and Skittles use an ink that doesn't dissolve (but is safe to eat) in the letters. While the rest of the candy will dissolve in water, the letters won't. Although some of the letters will not survive this process intact, a few should!

Cell Cake

Cells are made up of components called organelles ("little organs"). Plant and animal cells have different structures. You can use candy to learn about these fascinating, microscopic building blocks of life by creating a cell cake!

If you are interested this topic, be sure to explore the Mensa Foundation's lesson plan on the cell, which can be found here: <http://tinyurl.com/mensafoundationthecell>.

Materials

- Prepared and frosted cake (may use purchased cake)
- Assorted candies (see chart below for ideas)



Directions

- Using the candies, create a model of a cell on top of the cake. The candies represent the different parts of the cell. Other candies may be substituted, and not all parts of the cell need to be represented.
- The chart below lists some of the structures in a typical animal cell, along with a very basic explanation of the organelle's function.



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Animal Cell Component	Description/Function	Candy (suggestion)
Cellular membrane	Controls entry into and out of the cell; protects cell from the environment	Licorice strands
Nucleus	The central information center of the cell, housing the chromosomes (in nucleolus).	Big gumball, jawbreaker, or circular blob of dyed frosting
Mitochondria	The power plant of the cell. Mitochondria generate the cell's energy by using oxygen to release energy stored in cellular nutrients. Respiration also occurs in the cell mitochondria.	Fruit slices or Tootsie Roll®
Endoplasmic reticulum [ER] (rough and smooth)	Transport network and surface for nutrients – package and store protein	Gummy worms (use sugar-coated for rough ER and plain for smooth ER)
Golgi apparatus	Packages and distributes energy	Folded-over candy strips (such as Rainbow Tracks™) or hard ribbon candy
Cytoplasm	“Jelly” in which organelles float	Colored frosting (you may use frosting gel if you want to illustrate the texture of the cytoplasm)
Lysosomes	Store energy produced in Golgi apparatus	Mike & Ike®s
Vacuole	Stores food and waste (the warehouse of the cell); usually one big one in plants, multiple smaller ones in an animal cell	Dots® (use just one color) or Trolli® Gummi Apple O's®
Ribosomes	Protein makers (they are found near the rough ER and floating in the cytoplasm)	M&Ms®, Skittles®, or Raisinets®

Want to learn more about cells? Check out these Web sites!

<http://www.sheppardsoftware.com/health/anatomy/cell/index.htm> - Tutorials and a quiz

<http://vcell.ndsu.nodak.edu/animations/> - Virtual cell animations

<http://www.harcourtschool.com/activity/cell/cell.html> - Harcourt's Cell Inspector

http://www.cellsalive.com/cells/cell_model.htm - interactive cell model

<http://askabiologist.asu.edu/content/cell-parts> - more cell information and activities

<http://publications.nigms.nih.gov/insidethecell/> - booklet on cell biology from the National Institutes of Health