



DPTV's Digital Adventure

DIA Virtual Field Trip: Science at the Museum

Title of Lesson: Candy Chromatography
Grade Level/Content Area: Grades 2+ Science and Art
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School/District: New Paradigm for Education-Detroit Edison Public School Academy

Objective (Students will be able to...)	Students will be able to determine what pigments are present in Skittles and M&Ms.
Common Core State Standards	<p><u>CCSS.MATH.CONTENT.3.MD.B.4</u> Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.</p> <p><u>CCSS.MATH.CONTENT.4.MD.B.4:</u> Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8).</p> <p><u>CCSS.MATH.CONTENT.5.MD.B.2:</u> Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8).</p>
Subject-Specific Standards	<p>Michigan Science Standards</p> <p>K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.</p> <p>3-PS2-2 Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.</p> <p>3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</p> <p>5-PS1-3 Make observations and measurements to identify materials based on their properties.</p> <p>3-5-ETS1-2 Generate and compare multiple possible</p>

	<p>solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</p> <p>MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.</p> <p>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.</p> <p>Next Generation Science Standards:</p> <p>HS-PS1-2: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table and knowledge of the patterns of chemical properties.</p> <p>HS-PS1-4: Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends on changes in total bond energy.</p> <p>Michigan Art Standards</p> <p>ART.VA.II.2.3 Understand and recognize how artists create and construct multiple solutions to visual problems in artworks.</p> <p>ART.VA.V.2.1 Describe how art is used in everyday life.</p> <p>ART.VA.II.3.1 Apply materials and techniques to problem solve in the creation of art.</p> <p>ART.VA.II.4.1 Synthesize the use of a variety of materials, techniques, and processes to problem solve in the creation of art.</p> <p>ART.VA.II.5.1 Synthesize the knowledge of materials, techniques, and processes to create artwork.</p> <p>ART.VA.II.6.1 Identify, design, and solve creative problems at a developing level.</p> <p>ART.VA.II.7.1 Identify, design, and solve creative problems at an emerging level.</p> <p>ART.VA.II.8.1 Effectively identify, design, and solve creative problems.</p>
Materials Required (Per student or student group)	<ol style="list-style-type: none"> 1. 2 green Skittles 2. 2 green M&Ms 3. Aluminum foil 4. Water 5. Dropper 6. Toothpicks

	<ol style="list-style-type: none"> 7. Pencil 8. 2+ coffee filters 9. Scissors 10. Ruler 11. Salt 12. 2 tall clear cups 13. Tape
Technology Integration	<p>Prehistoric Pigment: Raw to Ready: http://dptv.pbslearningmedia.org/resource/c53a8293-cd24-4bd4-8704-4246e6d5b66d/bentley-chapter-6/</p> <p>A Peep for All Seasons: http://dptv.pbslearningmedia.org/resource/fd7a75c6-3d88-4d52-acb0-4f5af0d1655b/fd7a75c6-3d88-4d52-acb0-4f5af0d1655b/</p>
Lesson Introduction/Hook	How are the color pigments in Skittles and M&Ms different?
Lesson	<ol style="list-style-type: none"> 1. Cut the filter paper into strips that measure 6cm x 8 cm with straight edges. 2. Using a pencil, write M&Ms on one strip and Skittles on the other. 3. At the bottom of each strip, use a ruler to find the point 1 cm from the bottom of the paper. Make pencil dots at 2cm and 4 cm across. 4. Study the color of the green Skittle and the green M&M. Record observations and make predictions. 5. Cut out 2 small pieces of foil. 6. Place 2 separate dots of water on top of each of the pieces of foil. 7. Place a green M&M on each drop on one piece of foil. 8. Place a green Skittle on each drop on the other piece of foil. 9. Wait a minute for the candy color to seep into the water. 10. Dip a toothpick into the pool of green M&M dye. Touch it just above where you made a pencil dot at 2cm on the filter strip labeled M&M. 11. Dab another dot at the 4cm on the same green M&M filter paper. 12. Using another toothpick, dip into the pool of green Skittle dye. Touch it just above where you made a pencil dot at 2cm on the filter strip labeled Skittles.

	<ol style="list-style-type: none"> 13. Dab another dot at the 4cm on the same green Skittle filter paper. 14. Let the dots dry. This should take a minute or so. 15. Repeat steps #10-14 at least 4 times to saturate the color, allowing it to dry between each application. 16. While you are waiting, taste the green M&M and green Skittle does the green color taste the same in both candies? 17. Make a salt-water solution by combining 3 cups of water with 1/8 tsp of salt. 18. Pour some salt solution into each of your glasses about 1 cm deep. 19. Hang each of your filter papers so it is just touching the edge of the water. Tape it in place to the side of the glass. 20. When you see the wet layer of salt water has travelled up ½ cm from the top of the strip, remove it from the liquid. 21. Set the strips on a clean, flat dry surface to dry. 22. Observe the strips. Try to match the bands you see to the dye colors on the candy wrappers. Measure and record the distance each dye travelled. 23. You should expect to see yellow green and blue dyes on the strips. The Skittle should show more yellow prominence and M&M should show more blue prominence.
Lesson Modifications	<p>Test and compare other candies that use dyes such as Peeps, jawbreakers, jelly beans, etc. or different color M&Ms and Skittles.</p> <p>Test grape drink mix by making a concentrated solution of 2 grams drink mix powder with 5mL of water in a medicine cup. Allow the solution to saturate just the edge of the filter paper and determine what colors of dye are used in the drink mix.</p>
Assessment/Check for Understanding	Exit ticket

Candy Chromatography Observations and Predictions

Candy	Observation	Prediction
M&Ms		
Skittles		

Candy Chromatography Exit Ticket

The green M&M had more prominent _____ colored dye and the green Skittle had more prominent _____ colored dye.