



DPTV's Digital Adventure

DIA Virtual Field Trip: Science at the Museum

Title of Lesson: Exploring Pigments in Flowers
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 if the pigments are the same in multiple different types of red flowers.
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 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</p>

	<p>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: 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. 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 ART.VA.II.2.3 Understand and recognize how artists create and construct multiple solutions to visual problems in artworks. ART.VA.V.2.1 Describe how art is used in everyday life. ART.VA.II.3.1 Apply materials and techniques to problem solve in the creation of art. ART.VA.II.4.1 Synthesize the use of a variety of materials, techniques, and processes to problem solve in the creation of art. ART.VA.II.5.1 Synthesize the knowledge of materials, techniques, and processes to create artwork. ART.VA.II.6.1 Identify, design, and solve creative problems at a developing level. ART.VA.II.7.1 Identify, design, and solve creative problems at an emerging level. ART.VA.II.8.1 Effectively identify, design, and solve creative problems.</p>
Materials Required	<ol style="list-style-type: none"> 1. Thick paper towels 2. Scissors 3. Pencil 4. Ruler 5. Jar, drinking glass or mug 6. Measuring cup 7. 70 percent rubbing alcohol 8. Water 9. Large-mouth glass jar 10. Large red flower petals (try to get at least 2 flower petals from at least three different plants). Or try to get similarly colored flowers such as purple or orange. 11. Scratch paper 12. Coin 13. Timer
Technology Integration	<p>Camouflaging Cuttlefish: http://dptv.pbslearningmedia.org/resource/nat16.sci.lisci.cuttlefish/camoufl</p>

	aging-cuttlefish/
Lesson Introduction/Hook	Are all red flowers the same? Students will investigate if the pigments from one red flower are the same as another red flower. How can a flower's pigments help attract pollinators such as honeybees, butterflies or hummingbirds?
Lesson	<ol style="list-style-type: none"> 1. Cut the paper towels into strips that are one inch wide. Make each strip the same height as your large-mouth glass jar. Cut at least one strip for each type of flower. 2. Draw a pencil line one inch from the bottom end of each paper strip. 3. At the other end of each paper strip, use a pencil to label which flower will be spotted on the strip. 4. In a clean jar, drinking glass or mug, mix $\frac{1}{4}$ cup of water with $\frac{1}{4}$ cup of rubbing alcohol. Pour a small amount of the mixture into the large-mouth glass jar, a little less than 1 inch deep. 5. Place a piece of scratch paper on a hard, flat surface. Some pigments may stain so make sure this is a protected surface. Put one of the paper towel strips on top of the piece of scratch paper. Lay a flower petal on the paper strip over the line you drew. 6. Roll a coin on its edge like a wheel over the petal and across the pencil line. Push down hard so the petal is crushed and a strip of the pigment is visibly transferred to the paper towel strip. Repeat this 3-4 times using a fresh part of the petal each time so a thick line of pigment is transferred to the pencil line. Record observations of how the pigment looks. 7. Tape the strip to the pencil so that when the pencil is laid horizontally across the top of the glass jar, the strip hangs straight into the jar and the bottom edge of the strip is just barely immersed in the rubbing alcohol mixture. The pigment line should not be immersed in the liquid. 8. Lay the pencil across the top of the large-mouth glass jar and let the liquid rise up the paper towel strip until the liquid is about an inch from the top of the strip. Remove the strip. Record what happened to the pigment on the strips. 9. Allow the strip to dry out. 10. Follow steps #5-9 for the other types of flower petals. 11. Look at all the finished paper towel strips. If you see the same colored band around the same height on different paper strips, it is likely the same pigment. Do any of the flowers have more than one pigment?
Lesson Modifications	Do this experiment with purple, orange, or other dark-colored flower petal or leaves. Compare your results.
Assessment/Check for Understanding	Exit ticket

Flower Petal Chromatography Exit Ticket

Do you think these flowers have the same type of pigments?
Explain your answer.
