

***Colors Count:
Exploring Math and Science with the Color Wheel***

Grades: Pre-K – Grade 1
Subject: Visual Arts, Science, Math
Time Required: 30-45 Minutes
Author: Biggs Museum Curator of Education
Featured Biggs Artworks: *Portrait of Vincent Lockerman*, John Hesselius, 1750s
Armchair, Philadelphia 1800-1815, mahogany, mahogany veneer, ash
Reproduction of Federal Era Wallpaper at The Biggs Museum of American Art
Still Life with Grapes and Wineglass, Andrew John Henry Way, 1876
View from New Jersey toward Wilmington, Delaware, Clawson Shakespeare Hammitt, after 1895
Summer Girl, Robert Reid, 1899

<u>ANCHOR STANDARDS:</u>	<p>VA: Cr1.2.PKa</p> <p>VA: Cr2. 3. PKa, Ka, 1</p> <p>VA: Re8.1.PKa, Ka, 1</p> <p>Math: Content.K.G.A.2</p> <p>Math: Content.K.G.B.5</p> <p>Math: Content.1.G.A.1</p> <p>Science: K-LS1-1 - Plants & Animals Needs</p> <p>Science: 1-LS3-1 - Heredity</p> <p>Science: 2-LS2-1, 2-ETS1-B – Ecosystems</p>
<u>ESSENTIAL QUESTION and ENDURING UNDERSTANDING:</u>	<p>VA: How does knowing the contexts, histories, and traditions of art forms help us create works of art and design?</p> <p>VA: How do artist and designers create works of art or design that effectively communicate?</p> <p>VA: How can the viewer “read” a work of art as text? How does knowing and using visual art vocabularies help us understand and interpret works of art?</p> <p>Math: Correctly name shapes regardless of their orientations or</p>

	<p>overall size</p> <p>Math: Models shapes in the world by building shapes from components and drawing shapes</p> <p>Science: Plan and conduct an investigation to determine if plants need sunlight and water to grow</p> <p>Science: Make observations to construct evidence-based accounts that young plants and animals are like, but not exactly like their parents</p> <p>Science: Designs can be conveyed through sketches, drawing, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people</p>
<u>PERFORMANCE STANDARD:</u>	<p>Engage in self-directed, creative making</p> <p>Create and tell about art that communicates a story about a familiar place or object/ Create art that represents natural and constructed environment/Identify and classify uses of everyday objects through drawings, diagrams, sculptures, or other visual means</p> <p>Interpret art by identifying and describing subject matter/Interpret art by categorizing subject matter and identifying the characteristics of form</p>
<u>I CAN STATEMENT</u>	<p>I CAN make art</p> <p>I CAN create a story from a piece of art/ I CAN make art by looking at the world around me/ I CAN use everyday objects as inspiration to make something new by looking at the world around me</p> <p>I CAN tell you what the artwork is about/ I CAN describe what the artwork is about</p>
<u>ACCELERATION STRATEGIES:</u>	<p>Students will see six works from the Biggs collection, each with a focus on a different color from the color wheel. Instructors will use each work segue into discussions of shapes, weather, and nature.</p> <p>Students will use what they've learned to draw objects from nature that correspond to the colors on the color wheel using an included worksheet.</p>

<p><u>ACTIVATING STRATEGIES:</u></p>	<p>Cochineal Bug – insect that lives and feeds on cacti and is used to make red dye for clothing, makeup, and foods Pattern – a repeated decorative design Primary Colors – a group of colors from which all other colors can be obtained by mixing – red, blue, yellow Secondary Colors – colors resulting from the mixing of two primary colors – purple, green, orange Seed – a flowering plant's unit of reproduction, capable of developing into another such plant Silk Worm – caterpillar that spins a silk cocoon that is processed to make silk</p>
<p><u>LEARNING STRATEGIES:</u></p>	<p>Students apply what they've observed in the objects at the Biggs to fill their own color wheel with objects from nature</p>
<p><u>SUMMARIZING STRATEGIES:</u></p>	<p>If time permits, students can have time to share what they've drawn with the group.</p>
<p><u>EXTENDED THINKING STRATEGIES:</u></p>	<p>This lesson could be an introduction to a lesson or multiple lessons on color mixing</p>

Featured Biggs Artwork

- Portrait of Vincent Lockerman*, John Hesselius, 1750s
- Armchair*, Philadelphia 1800-1815, mahogany, mahogany veneer, ash
- Reproduction of Federal Era Wallpaper at The Biggs Museum of American Art
- Still Life with Grapes and Wineglass*, Andrew John Henry Way, 1876
- View from New Jersey toward Wilmington, Delaware*, Clawson Shakespeare Hammitt, after 1895
- Summer Girl*, Robert Reid, 1899

Lesson Overview

To learn about various subject areas through an exploration of the color wheel

Learning Objectives

Primarily, students should be able to:

- Understand the different ways that art can relate to science and math
- Use the color wheel to identify what combinations of primary colors result in specific secondary colors
- Be aware of some of the ways that humans can use insects in daily life
- Understand the different natural materials that humans use
- Realize that different fruits and nuts grow on different kinds of plants and that they can be made into other foods
- Identify the colors in a painting that indicate to viewers the weather and season of a scene

Materials

- Image of a cochineal bug
- Image of a silk worm
- Image of a walnut and walnut tree
- Image of an apple seed and apple tree
- Color wheel worksheet
- Colored pencils

Lesson Steps

1. Explain how to use a color wheel
 - a. The color wheels show relationships between colors
 - b. Primary colors are the group of colors from which all other colors can be made, they are red, blue, and yellow
 - c. Secondary colors are any colors that result from mixing two primary colors
 - d. On the color wheel, the secondary colors are those that result from mixing the adjacent primary colors

2. View the painting *Portrait of Vincent Lockerman*, John Hesselius, 1750s
 - a. Ask the students to identify the most prominent color in the painting
 - b. Explain that fabrics need to be dyed with different things to make them certain colors and ask them what they think could be used to make red dye
 - c. Show them the picture of the cochineal bug and explain the dye making process
 - i. Using cochineal dye is an ancient technique where cochineal bugs are harvested from cacti and boiled
 - ii. The remaining residue is used as red dye
 - iii. The dye was used to dye the first American flag, and it's still used today in clothing, make-up, and food dyes

3. View the yellow armchair from Philadelphia 1800-1815, mahogany, mahogany veneer, ash
 - a. Ask the students to identify the most prominent color in the chair
 - b. Explain that the cushion on the chair is covered in silk which is made from silk worms, who spin silk the way that spiders spin webs
 - c. Ask the students what else on this chair might have come from nature
 - i. Ask them where wood comes from
 - ii. Ask them what else can be made from trees
 - d. Tell students that the next art you see will be orange and ask them to use the color wheel to tell you what color they would need to mix with yellow – like in the chair – to get orange. Then ask them to tell you what you’ve already seen that is red.

4. View the Reproduction of Federal Era Wallpaper
 - a. Ask the students to identify the most prominent color in the wallpaper
 - b. Explain that in the past Americans liked to decorate their houses with brightly colored wallpaper because they did have electricity to brighten up their homes
 - c. Tell students that wallpaper uses a pattern, which means it’s filled with repeated shapes
 - d. Ask student to identify some of the shapes in the pattern
 - i. When a shape is identified, ask students to describe that shape, i.e. how many lines does it have? Are the lines straight or curved?
 - ii. then ask them what other objects in nature are shaped like this

5. View the painting *Still Life with Grapes and Wineglass*, Andrew John Henry Way, 1876
 - a. Ask the students to identify the color of the grapes
 - i. Ask them to explain what colors you would need to mix to get that color and then ask them what they’ve seen that is yellow and what they might see that is blue
 - b. Explain that all the foods in this picture came from seeds
 - i. Ask them what a seed is, what it grows, and what it needs to grow
 - c. Explain that all nuts, like the walnuts in this painting, are actually seeds that grow into different plants
 - i. Ask them what other kinds of nuts they can think of and how those nuts are used to make other foods
 - ii. Ask them what they think the walnut grows into and show them the picture of the walnut tree
 - iii. Ask them if they think the walnut grows into the walnut tree quickly or slowly
 - d. Show students a picture of an apple seed and have them guess which fruit it grows into
 - i. Ask them what apples grow on – vines, bushes, trees?
 - ii. Ask them to identify what foods can be made from apples

6. View the painting *View from New Jersey toward Wilmington, Delaware*, Clawson Shakespeare Hammitt, after 1895

- a. Remind students of the “blue things” they thought of when looking at the last painting
 - b. Ask the students where they see blue in the painting
 - c. Explain to students that this painting shows a place in Delaware
 - i. Ask students what colors they see in the sky in Delaware
 - ii. Ask students what time of day they see those colors and what the weather is like when they see them
 - iii. Help them use this knowledge to determine what time of day is shown in the painting and what the weather might be like
 - iv. Ask them what other colors in the sky might tell us about the weather or time of day
7. View the painting *Summer Girl*, Robert Reid, 1899
- a. Ask students to identify the color of the woman’s shirt
 - i. Help students use the color wheel to determine which colors are mixed to make the color purple and ask them what they’ve seen so far that is those colors
 - ii. Encourage them to find these colors in the painting
 - b. Explain that this painting depicts a very specific time of year
 - i. Ask the students what time of year they think is seen in the painting and why they think that
 - c. Remind them of each of the colors they’ve seen in this lesson
 - i. Encourage the students to share what colors they would use if they painted a painting of each season
8. Activity
- a. Ask students to fill each space of the color wheel with things from nature that are those colors
 - i. Move through the wheel with them, reminding them which primary colors are mixed to create the secondary colors
 - b. You may want to remind students of some of the things they’ve seen in the paintings to get them started