



04737 Fuller Road, East Jordan, MI 49727  
 (231) 536-3369 | <http://www.MiRavenHill.org>  
 info@miravenhill.org

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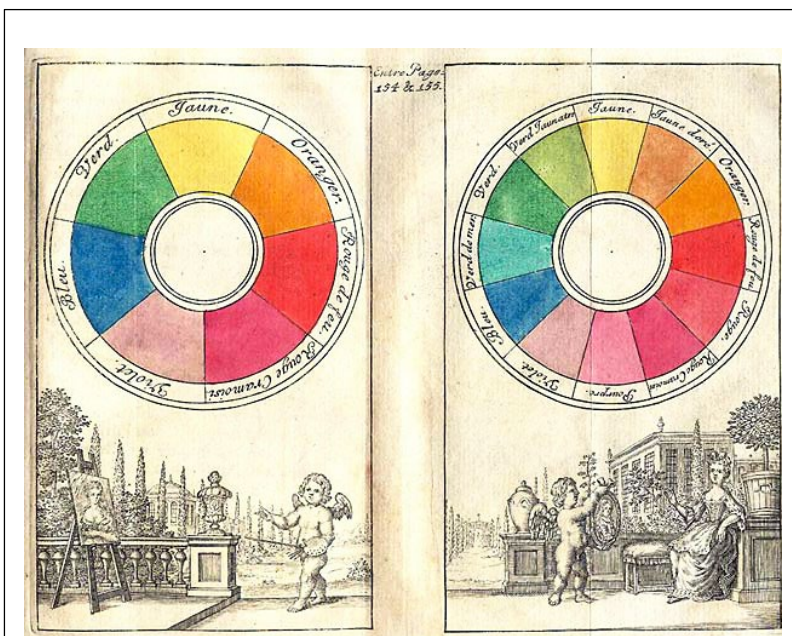
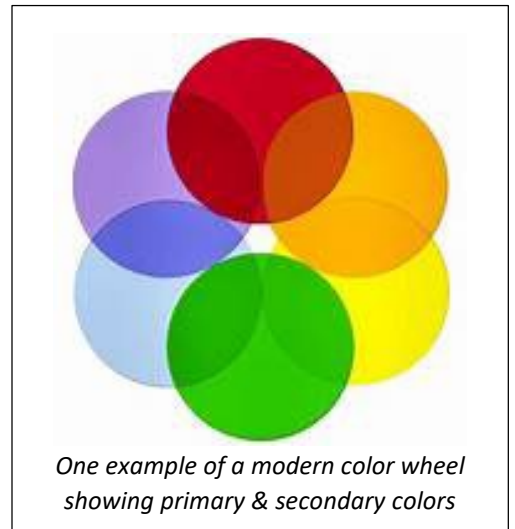
**Mission:** Raven Hill provides a place that enhances hands-on and lifelong learning for all ages by connecting science, history & the arts.

To: Friends and Family everywhere  
 From: Cheri and Raven Hill  
 Date: February 5, 2022  
 Re: Color wheels or color circles!

Greetings, Everyone!

This is the time of the year that some of us start getting tired of all the white snow outside and start thinking about the coming spring with all its magnificent colors. We peruse the seed catalogs and plan our garden. We anticipate seeing the first green leaves of daffodils pushing out of the ground or the purple of a crocus blossom just opened. That makes the color wheel or color circle another way for Raven Hill to connect science, history and art! Hope this missive brings some color to your day!

A color wheel or color circle illustrates the arrangement of colors around a circle, including the primary, secondary and sometimes tertiary colors. Color wheels are used by artists, as well as home interior and fashion designers. There are many variations of color wheels and they have been around for hundreds of years!



Claude Boutet's 7-color and 12-color color circles  
 (The Hague, 1708), reproduced in  
**The Creation of Color in Eighteenth-Century Europe.**

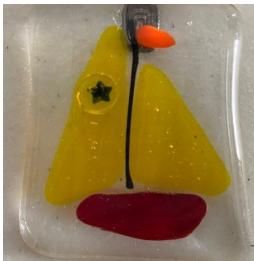
Over 2300 years ago, Aristotle believed God sent the colors from the heavens through rays of light. He believed that colors came from white and black (lightness and darkness) and related them to the four elements –earth, air, fire and water. Then, about 2000 years later, Newton wrote his book on *Opticks*, one of the great scientific works of his time. The book describes Newton's discoveries about light passing through a prism. Newton found that a prism separated white light into the colors of the rainbow as each color was refracted or bent at a different angle. Newton identified the "ROYGBIV" colors (Red, Orange, Yellow, Green, Blue, Indigo, Violet) that we all know so well. Those colors make up the visible spectrum and cause rainbows, when water droplets act like tiny prisms & bend each color of light a bit differently.



**RED**  
Paper mache  
cardinal



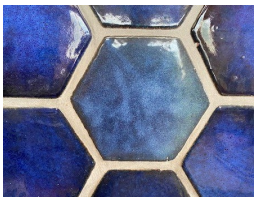
**ORANGE**  
Alabaster  
sculpture



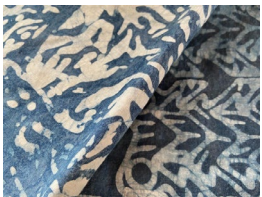
**YELLOW**  
Fused glass  
pendant



**GREEN**  
Felted frog



**BLUE**  
Ceramic tiles



**INDIGO**  
Cotton flag



**PURPLE**  
Glass vase

In the 1700's, Jacob Christophe LeBlon invented the three-color process of color printing. He mixed the primary colors of red, yellow & blue in different combinations to create the secondary colors—green (yellow & blue); purple (red & blue); and orange (yellow and red). LeBlon differentiated the “material colors” as opposed to the colored light, which Newton described in *Opticks*.

You can find both color systems at Raven Hill: additive and subtractive. The Center's prisms and the Colored Light exhibit are examples of the additive color system that Newton described. When mixed, the primary additive colors (red, green & blue) produce transparent or **white** light. On the other hand, the paintings and sculptures at Raven Hill are examples of the subtractive color system, which is based on the chemical makeup of the particular object and its reflection of light as a color. Subtractive primary colors (blue, red & yellow) are often taught to school children. When the three colors are mixed together in the right proportions, they theoretically produce **black**. Our school experiences tell us that we often get a muddy dark gray, since our proportions are “off”!

In fact, we wear light-colored clothing in the summer to reflect light and keep us cool. A white shirt reflects all the colors to our eyes, so we see white. We wear dark-colored clothing in the winter to absorb light energy and keep us warmer. A black shirt absorbs all the colors and reflects no color to our eyes, so we see black. A red shirt absorbs all the colors, except red, which is reflected to our eyes, so the shirt appears red. Now, try your hand at explaining why the cardinal is red & the frog green in the pictures to the left!

Johann Wolfgang VonGoethe published his book on the *Theory of Colors* in 1810 and it was one of the first explorations of how certain colors can create psychological reactions, changing someone's mood or emotion. He didn't have much evidence to back up his ideas, basing his color theory on his intuition and not any scientific principles. Even so, his ideas are very similar to how modern science understands human reactions to color. Think about how different colors affect you!

*(Left) ROYGBIV, the color spectrum is “visible” everywhere, especially at Raven Hill. Next time you visit the Center, enjoy a little scavenger hunt. Look for the visible ROYGBIV colors found in the artifacts, exhibits, facilities and nature here. Can you find examples of your favorite color or explain why blue is blue? Practice finding & explaining colors at home, before your next visit!*

Raven Hill is open to the public noon to 4pm on Saturdays and 2pm to 4pm on Sundays, plus any other time by appointment. You can email [info@miravenhill.org](mailto:info@miravenhill.org) or call 231.536.3369 for reservations. Think about scheduling a field trip, birthday party or a scout group soon, since spring is coming with all its beautiful colors. The Smithsonian **Labor Days: History of Work** exhibit remains on display during regular hours or by appointment. Again as a reminder, we continue to ask visitors to mask indoors for the sake of the vaccinated and the unvaccinated. We look forward to your visit!

Cheri