

3D COLOR WHEEL

ELEMENTARY SCHOOL LEVEL 2

Today, let's create rainbows of paint by mixing three primary colors. But why show this using a flat traditional wheel—when we can make color explosions in three dimensions! Building a 3D color wheel is a fun study in engineering and spatial thinking. Provide students with paint (red, blue, yellow), paint brushes, stirs, and cups for mixing. They need white paper plates for the painting surface, and paper clips to hold them together.



EDUCATIONAL STANDARDS:

NGSS CONNECTION:

4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

COMMON CORE CONNECTION: ELA/Literacy

SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

Mathematics

MP.4 Model with mathematics.

4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

DOK:

Level 2 - Concept

Level 3 - Strategic Thinking

Level 4 - Extended Thinking

MATERIALS NEEDED:

- ☐ 4 white paper plates
- ☐ 12 paper clips
- ☐ Red, blue, yellow paint
- ☐ Paint brushes
- ☐ Mixing cups and stirs
- ☐ String for hanging

DIRECTIONS:

1. Fold your plates in half to make a crease. Unfold and lay them flat, then paint the plates in the following color order:

Plate 1 Front: All Blue. Back: Half Blue/Green & Half Blue/Violet

Plate 2 Front: All Red/Violet. Back: Half Violet & Half Red

Plate 3 Front: All Orange. Back: Half Red/Orange & Half Yellow/Orange

Plate 4 Front: All Yellow/Green. Back: Half Yellow & Half Green

Let the paint dry fully before moving on.

2. Refold the plates along the crease marks you made, with solid color side folded on the inside. Put a paperclip in the middle.
3. Crease both open sides into triangles. This will make it look a bit like a bowtie.
4. Follow the same steps with all 4 of the plates.



5. Match the plates up with each other to form a primary color wheel.
6. Attach the plates to each other with paperclips.
7. Tie a large knot in the string to pull through the center of the color wheel. Make the knot large enough to hang the wheel on.

WHAT DO WE NEED TO KNOW?

The color wheel is a circular illustration of color hues that shows the interaction between primary and secondary colors.

Primary colors: Red, Blue, Yellow

Secondary colors: Purple, Green, Orange

OBJECTIVE:

Students will be able to develop a model to describe how objects are seen by reflecting light.

ESSENTIAL QUESTIONS:

- How do we see things?
- How do we see different colors?



FUN FACTS

- A. **Colorblind people tend to have better night vision.**
- B. **Approximately seven million different colors can be seen by the human eye.**
- C. **Impossible colors such as red-green and yellow-blue are colors that are too complex for the human eye.**

ENGAGE / EXPLORE:

1. Students build the Thaumatrope activity
 - a. Allow students to construct
 - b. Allow students to play with the toy
2. Ask students to produce and model (refer to NGSS use of “Model”) how it works
 - a. Use words, pictures, and arrows
 - b. Students may have gaps in their explanation (that is OK!)
3. Evaluate
 - a. Informally evaluate their models
 - b. Identify student prior knowledge and misconceptions

EXPLAIN:

1. Read a few children's books on light
 - a. Light: Shadows, Mirrors, and Rainbows
 - b. Light Is All Around Us
2. Watch the *Bill Nye the Science Guy* [episode on light](#) and/or *Cosmos: A Spacetime Odyssey* [Episode 5](#)
 - a. Students can have a question worksheet to supplement the movie.
 - b. Lessons on light or discussion should follow the movie and books.
3. Students build the 3D color wheel activity
 - a. Identify how colors mix to produce new colors
 - b. Construct a simple model from learning sequence
 - i. Explain how we see different colors
 1. Frequency difference
 2. Absorbed light vs reflected light.
4. Evaluate
 - a. 3D color word explanation
 - b. Comprehension and misconceptions after video and books

ELABORATE:

1. Students revisit their Thaumatrope model
 - a. Use their learning to revise model
 - b. Should use evidence from sequence as support for the new model
2. Evaluate
 - a. Model iterations and growth
 - b. Use of learning sequence to revise and expand model

