THAUMATROPE ELEMENTARY SCHOOL LEVEL 2

A thaumatrope consists of two images drawn on opposite sides of an object that's attached to two pieces of string. When you flip the thaumatrope back and forth, you are able to see both pictures at once, due to the phenomenon of "persistence of vision"—the eye's ability to retain an image for roughly 1/30 of a second after the object is gone. If you flip the thaumatrope fast enough, your brain retains the two different images long enough to build up a composite image. The faster you flip it, the more clearly the illusion appears.

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:

- Permanent markers
- Flat plastic disk or rectangle
- String or pipe cleaners

DIRECTIONS:

- Pick the images you would like to blend into one: flowers and a vase, bacon and eggs and a pan, a bird and a cage, any two things that will work well together. You could even use text.
- 2. Draw an image on one side of your disk.
- 3. Flip the disk to the other side. Be sure to turn it on the same axis that it rotates on. This will prevent your image from being upside down.
- 4. When drawing the second image, you want to pretend that the first image is in the same place. (But don't redraw it!) You are making a composite image.
- 5. Attach string to the sides of the disk.
- 6. Twist the string rapidly between your fingers. You will see the images become one as the Thaumatrope spins in your fingers.





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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?

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 a model (refer to NGSS use of "Model") of 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

*Continue on to the second part of this combined lesson plan, "3D Color Wheel"



- A. Half of our brain is required each time we focus on a new object.
- B. Humans have two eyeballs to identify the distance of an object and see the world in three dimensions.
- C. The human eye will focus on about 50 things per second.