



Curiosity Guide #705

Color Science

Accompanies Curious Crew, Season 7, Episode 5 (#705)

Decoder Colors

Investigation #2

Description

Can you make a message that appears and disappears, simply by changing colors?

Materials

- Red acetate film or cellophane
- Variety of colored filters
- Scissors
- Tape
- Paper
- Red ballpoint ink pen
- Yellow highlighter
- A sharp blue crayon
- Water-based markers
- A friend

Procedure

- 1) Be sure the tip of the blue crayon is sharp.
- 2) Write messages in the centers of several pieces of paper, and then set aside.
- 3) Use the red ballpoint ink pen to draw carefully over the messages with a series of hash marks or X marks. The messages should be hard to see under a layer of marks.

- 4) Periodically lay the red filter on top to be sure the marks are not too thick.
- 5) Use the yellow highlighter to make additional marks on top to make the message harder to see. Again, use the filter to make sure the message is still visible.
- 6) Show the messy messages to a friend. Can your friend read the messages? Then place the red filter on top of the paper.
- 7) What does your friend notice?
- 8) What happens if you use a filter of a different color over a message?
- 9) What happens if you use water-based markers of different colors?
- 10) How does each color change under the different colored filters?

My Results

Explanation

Colors that we see are the result of different combinations of red, green, and blue light. These are the primary colors in an additive color system. Unlike a clear piece of glass that transmits all colors, colored filters transmit the color of the filter. If the filter is red, then red is transmitted. The blue and green in the light get absorbed by the red filter. Therefore, the white of the paper looks red, as that is the color getting through. That red color masks the red ink on the message but is absorbed by the blue crayon, making the message appear darker and more visible. The wax of the crayon does not mix well with the red ink or highlighter and will not transmit light as easily as the ink and highlighter do. This layering of the colors lets the red light show or transmit through the ink and highlighter and get absorbed by the wax messages.

Increase your understanding. As we look around, we cannot help but notice and appreciate all the colors that surround us. To make sense of color requires us to think about light. Light from the sun is actually energy waves grouped into an entire spectrum. Our eyes detect different waves in the spectrum that our brains understand as color, but the part of the spectrum we can see is quite small. On one end of the visible spectrum there are short blue wavelengths, and on the other end of the spectrum are long red wavelengths. White light is made of a combination of waves we see as red, orange, yellow, green, blue, indigo, and violet, or, for short, ROY G BIV!

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