



Rainbow Paper

ROYGBIV! Learn how to replicate the colorful pattern you see in bubbles, prisms, and the sky. Become a physicist for the day and create your own rainbow paper!

TEKS:

SCI K.8 A: The student is expected to observe and describe weather changes from day to day and over seasons.

SCI 3.6 A: The student is expected to explore different forms of energy, including mechanical, light, sound, and thermal in everyday life.

SCI 3.8 A: The student is expected to observe, measure, record, and compare day-to-day weather changes in different locations at the same time that include air temperature, wind direction, and precipitation.

SCI 5.6 C: The student is expected to demonstrate that light travels in a straight line until it strikes an object and is reflected or travels through one medium to another and is refracted.

SCI 8.8 C: The student is expected to identify how different wavelengths of the electromagnetic spectrum such as visible light and radio waves are used to gain information about components in the universe.

Materials:

- Black paper
- Clear nail polish
- Plate or bowl
- Water

How To:

1. Pour water into your bowl or plate so that the water level is approximately two inches deep.
2. Slide a piece of black paper into the water. It should float just under the surface.
3. Place a drop of nail polish into the water and watch it spread into a film!
4. Carefully position your paper so that when you pull it out of the water, it captures the nail polish film.
5. Go ahead and pull your paper out as quickly as possible! If you mess up, you can use your finger to adjust the film on the paper (the film should be spread across the paper) or simply wipe away the film from the paper and try again.
6. Set your paper aside to dry, and your creation is complete. How does it look under different types of light?

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7. Try experimenting by using different colors of paper or cutting your paper into cool shapes before dipping it in the water!



STEM Explanation:

How were you able to create a rainbow pattern on your paper using just nail polish? Hint: it all has to do with the properties of light. Rainbows are optical illusions that only occur when some very specific conditions are met. Most of the light we see appears to be white, but there are actually several wavelengths (or colors) in light that our eyes can't see unless they are separated. One way they can be separated into their individual wavelengths is through *refraction*. An example of refraction is a rainbow, in which sunlight passes through raindrops and is split into its different colors.

You also created an example of refraction when making rainbow paper! When you dropped some nail polish into the water, its particles arranged themselves to create a thin film. When white light hit this film, some of it bounced back from the outer edge of the film and some of it traveled through the film. When these two paths of light combined, they created all the different colors! This color-creation works similarly to the formation of different-sized waves in the ocean. When two small waves come together from the same direction, they can create one big wave, or if they come from different directions, one smaller wave. Similarly, in your experiment, when different waves of light came together, they combined to create all the different colors of the rainbow!

Career Connection:

Physicists study the natural world, from the tiniest subatomic particles to the largest galaxies. They do experiments to discover the laws of nature. They study what things are made of (matter) and how things behave. They also learn about energy, studying how it changes from one form to another.

Resources:

<https://sciencenotes.org/rainbow-paper-thin-film-science-project/>

<https://www.popsci.com/how-rainbows-form/>

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