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Make a Rainbow

Introduction

A rainbow spread across the sky is one of the most exciting things to see in nature! Use household materials to bend light and learn about the science behind this colorful natural phenomenon.

Think About This

- Why do rainbows appear?

Tools & Materials

- A clear glass of water
- A white sheet of paper
- Sunlight

Directions

Use a glass of water and the sun to make a rainbow.

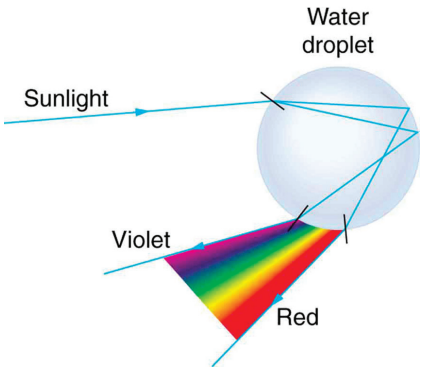
1. Fill a clear glass with water just over half full.

2. Lay down a white sheet of paper in a spot where the sun is shining directly on it.

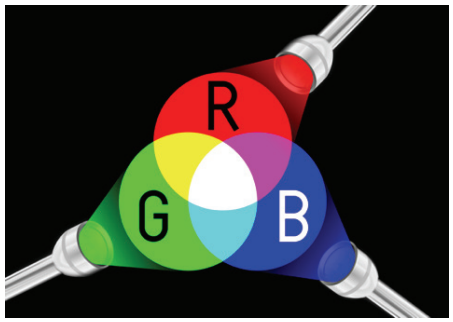
3. Carefully place the glass of water on the white sheet of paper. If a rainbow doesn't appear right away, lift the glass up a few inches and gently tilt it back and forth towards the sun until you can see a rainbow.

What's Happening?

If many different colors of paint were mixed, they would make a dark and muddy mixture. Light works in the opposite way—if you shined lightbulbs of every color at the same time, it would make white light. The white light that comes to Earth from the Sun is a combination of every color of light—red, orange, yellow, green, blue, indigo, violet, and everything in between.



Each rainbow has two things in common: light and water. When white light passes through water, each color bounces out at a slightly different angle, separating the colors and making a rainbow. This process is called **refraction**. When we see a rainbow in the sky, the sun is shining through millions and millions of raindrops which all refract the sunlight, just like a prism to bounce the separate colors out towards our eyes.



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Make a Rainbow Continued

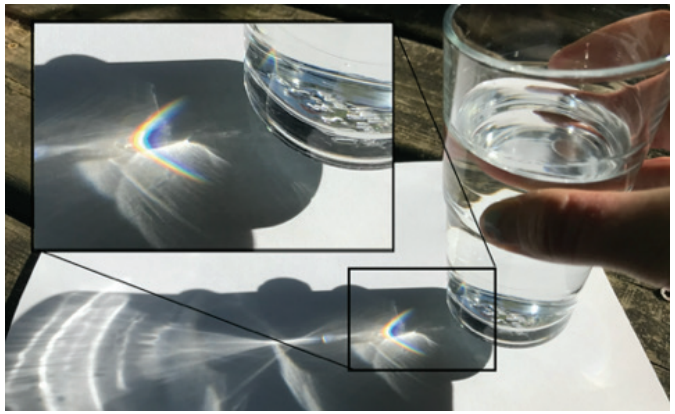
Take it Further

Now that you've made a rainbow of your own and understand how they form, go rainbow hunting on a rainy day! The best time to find a rainbow is when it is still raining a bit but the sun is coming back out. The best place to look for a rainbow is on the opposite side of the sky as the sun.

No rainy days ahead? That's okay! See what other materials you could use to refract light. Do you have to use water? What shapes make the largest rainbow? The smallest? Why do you think that is?

Fun Fact!

Sir Isaac Newton proved that sunlight is made of different colors using a prism – a triangular piece of glass. In addition to proving that white light could be split into a rainbow, he used a second prism to turn a rainbow back into white light!



Want more?

Try this light- and mind-bending experiment!

1. Fill your glass with water
2. Draw a horizontal arrow on your paper
3. Put the paper against the back of the glass so you can see the arrow by looking through the front of the glass.
4. Slowly move the arrow away from the back of the glass and see what happens!
5. Still not satisfied?
   Try adding a pencil, pen, or straw to the half-full glass of water. Look at it straight on. Why does it look so funny?

Light entering the water slows down, causing it to leave the water at a different angle than it entered, making it appear as the pencil or arrow has changed. This refraction happens because the speed of light is different inside different materials (air and water).

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