

# Liquid Prism

**Overview:** A prism un-mixes light back into its original colors of red, green, and blue. In this experiment, water is our prism. You can make prisms out of glass, plastic, water, oil, or anything else you can think of that allows light to zip through.

**What to Learn:** Today you're going to play with splitting apart white light into its primary colors. The color of light striking an object affects how our eyes see it.

## Materials

- mirror
- shallow baking dish
- sunlight
- index card

You'll also have one of the following:

- plain water
- baby oil or mineral oil
- water with one tablespoon of salt mixed in
- distilled white vinegar
- isopropyl rubbing alcohol
- clear liquid soap (do not mix with water)

## Experiment

1. Set a tray of liquid in sunlight. If you're using water, then fill your tray with water. If you're using salt, mix a tablespoon of salt into the water and then set it in sunlight. If you're using anything else, fill it with your liquid and set it outside.
2. Lean a mirror against the inside edge of the tray and adjust it so that a rainbow appears.
3. Use the index card (or another white surface) so that you can clearly see the reflection from your prism.
4. You can also use a light bulb as an alternate light source by shining it through a slit in a flat cardboard surface. However, you'll find that sunlight is much more effective and will make a brighter, more complete rainbow.
5. Troubleshooting: This is one of the easiest experiments to do, and the most beautiful. The trouble is, you don't know where the water shadow will show up, so make sure you point the mirror to the sky and play with the angle of the mirror until you find the wavering rainbow. If you still have trouble, use a large sheet of white paper instead of the tiny index card.

## Liquid Prism Data Table

Type of Liquid for the Prism	What did you observe?

### Reading

What is a prism? Think of a beam of light. It zooms fast on a straight path, until it hits something, like a water drop. As the light goes through the water drop, it changes speed. This is called *refraction*, which we will discuss more in a future lesson. The speed change depends on the angle at which the light hits the water, and what the drop is made of. If it was a drop of mineral oil, the light would slow down a bit more because the fluid has more optical density. So when white light passes through a prism, like that water drop, it changes speed, which we can see with our eyes because it also turns colors.

Prisms un-mix light into its different wavelengths. When light hits the prism, most of it passes through, although a small bit of light does get reflected off the surface, but when it passes through it changes speed. Since the sunlight is made up of many different wavelengths (colors), each color gets bent by different amounts, and you see a rainbow out the other side. As long as the light travels at the same speed (like through the air), it's white. But as soon as the light hits the water and bends at different angles, the wavelengths separate and spread out, making the rainbow you see.

**Troubleshooting:** This is one of the easiest experiments to do, and the most beautiful. The trouble is, you don't know where the water shadow will show up, so make sure you point the mirror to the sky and play with the angle of the mirror until you find the wavering rainbow. Because the shadow is constantly moving, you can snap a few pictures when you've got it so you can look over the finer details later. If this project still eludes you, take a large sheet and use it instead of the tiny index card.

## Exercises

1. What serves as the prism in this experiment?
2. What property can help make something a good prism material?
3. What are some other items that could be used as prisms?

**Answers to Exercises: Liquid Prism**

1. What serves as the prism in this experiment? (water or other clear liquid)
2. What property can help make something a good prism material? (transparency: a material that allows light to pass through it)
3. What are some other items that could be used as prisms? (glass, oil, clear plastic)