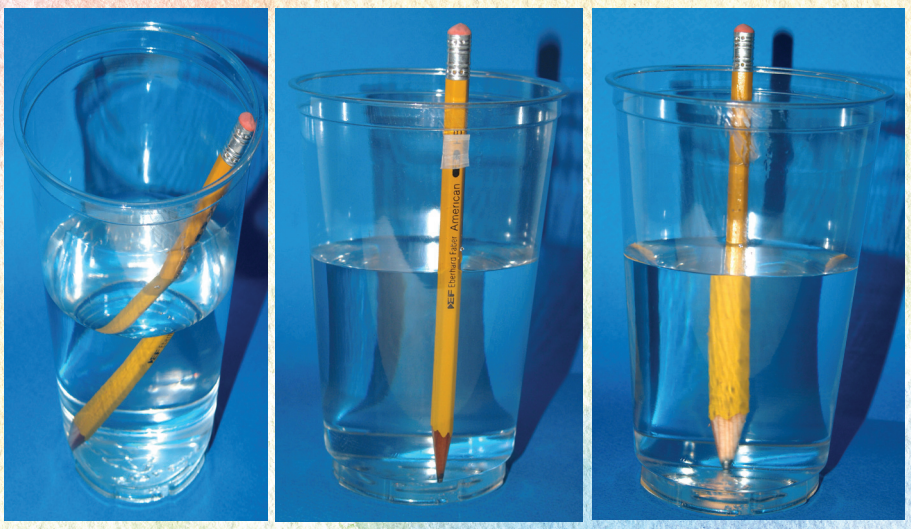
Rainbows: Light Refraction

At the beginning of the story, Tofu Ling and the Angel, the approaching holiday season is described as a "rainbow of celebrations" and the illustrator has carried this theme throughout the story. To learn about rainbows and how the white light of the sun separates into the bands of color in a rainbow, you will study and experiment with light refraction or bending.

To help you to understand why you are seeing the rainbow of colors, a little background information about light refraction or bending is helpful.

First, look at how light appears to bend things. You will need a pencil, clear glass, and water. Fill the glass half-way full of water and place the pencil in the glass of water. Describe how the pencil looks when you look down through the opening of the glass. Describe how the pencil looks from the side of the glass. See the photo below:

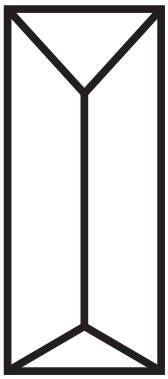


When you look from the top of the opening of the glass, the pencil should look similar to when it is out of the water. However, if you were to move further away from the opening of the glass the part of the pencil inside the water may appear to be larger. When you view the pencil from the side, the part of the pencil in the water will appear larger and somewhat bent.

The water magnifies the part of the pencil that is in the water. You can watch the magnification effects of the water by bringing the pencil closer to the side of the glass that is closest to you and then slowly moving the pencil across to the opposite side of the glass. As the light passes through the water, it magnifies the pencil in the water and appears to bend the pencil at an angle.

Next, we will examine how light is refracted or bent through the use of a prism. When you look at light, it appears to look white; however, light is made up of the seven colors that you see in a rainbow. The colors are red, orange, yellow, green, blue, blue-violet, and violet.

To study how light refracts or bends to create the colors of a rainbow we will use a prism. A **prism** is a triangular piece of glass or high quality plastic and due to its shape and ability to let light shine through, it will provide you with an opportunity to see a rainbow effect.



Prism

For this activity, you will need a prism, flashlight, and white paper. Set the prism on a white sheet of paper with the long side up, as shown to the left. Turn off any lights in the room so that only the flashlight shines through the prism. Experiment with shining the flashlight at different angles through the prism.

Look on the white paper for the rainbow effect. Look at the order of the colors of the rainbow. Answer the questions below.

Write down the order of the rainbow colors from the top of the arch to the bottom of the arch.

_____

_____

When you change the angle of the light passing through the prism does the order of the colors change?

_____

Why or why not does the order of the colors change?

_____

_____

_____

Answer: Red, orange, yellow, green, blue, and purple. No. When the beam of light separates into its different colors you will notice that each color bends at a slightly different angle and so the color order never changes.