

Eyes and Optics

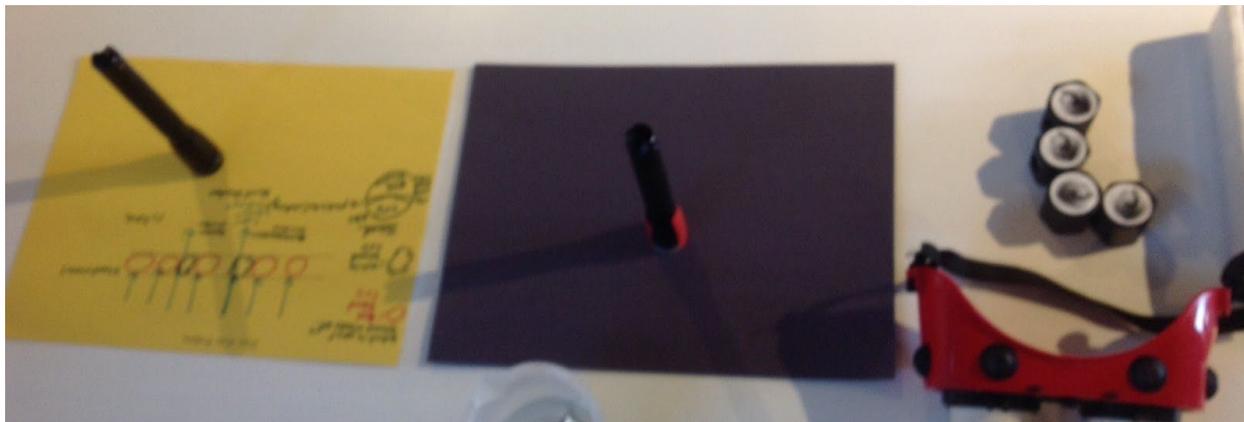
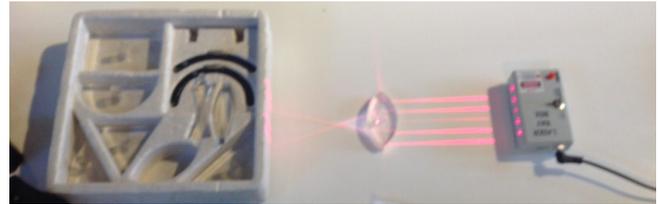
Objective: To teach all ages about the eye and how lenses bend light

Materials:

Jar of eyeballs
laser with lenses (pictured right)

Younger kids: large, square fresnel lenses
Small, wooden diffraction lenses
Black eye ball with mirrors
Upside down goggles

Older kids: blindspot worksheet
Small Lens and wax paper
Blue-light flashlight
White-light flashlight with black construction paper
3-E-ish eye diagram



Experiment:

Younger kids: Hand them small wooden diffraction lenses to look in. Ask them what do they see? Try all the materials and ask them what they see.

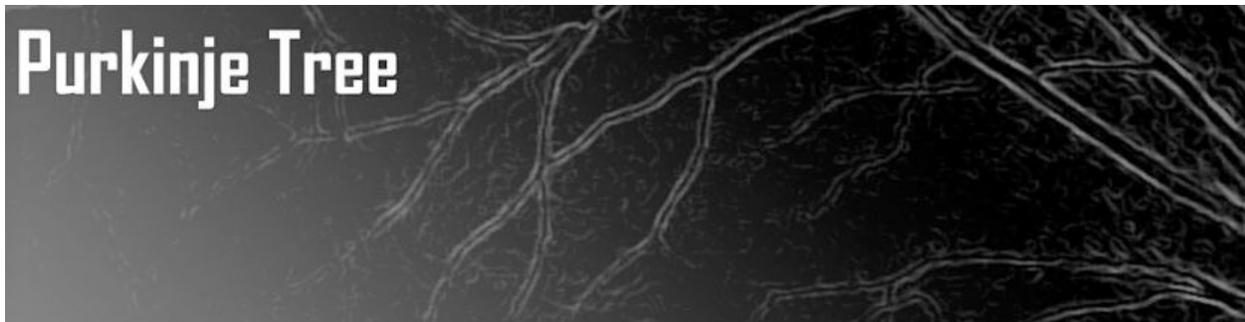
Older kids:

Intro: Can you see in the dark? Do your eyes work? What do you need to see? Light! How does the light from this whole big room fit into our small eyes? It gets bent like the lens is bending the light from the laser. How do the different shaped lenses bend the light?

Small lens and wax paper: Look at something bright so a light or a window. Set up the lens as your eye lens, the wax paper as the retina and then you are the brain. (lens, then wax paper, then your eye). You should see the image upside down and you can talk about why the image is upside down. Draw a human and draw the light from the legs being bent through a lens such that the light from the head is now at the bottom making the image upside down.

Blindspot sheet: Use the diagram at the bottom to show them how the eye works (with the image of the tree on the retina at the back of the eye. “There is a spot where the retina leaves and if an image hits there, the brain just fills it in. It’s called your blind spot.” Read the directions for them. Hold the sheet for them. Repeatedly tell them to look at the cross while slowly moving the sheet towards their face.

White flashlight and black construction paper: we have arteries in front of the retina in our eyes but we don’t see the arteries when we look at things because our brain fills in the image (like it fills in the image for our blindspot.) but we can trick our brain to let us see them. Hold the flashlight under your eye and move it back and forth under the eye while holding the black piece of construction paper in front of your eye to give you a dark background. You should see the spiderweb of arteries. Called [Purkinje Tree](#)



Blue flashlight: when we shine blue light into our eyes, the cells in the blood in those arteries absorb the blue light differently than other cells in your blood allowing us to see cells in our eyes! So in our blood, we have white blood cells and red blood cells. The red blood cells absorb the blue light so no light hits the retina resulting in a shadow. Blue light travels right through the white blood cells hitting our retina. So you should see little white “worms” with black “tails” swimming around. Those are the white blood cells with a red blood cell behind it moving around in the arteries in your eyes. Called [Blue-field entoptic phenomenon](#)