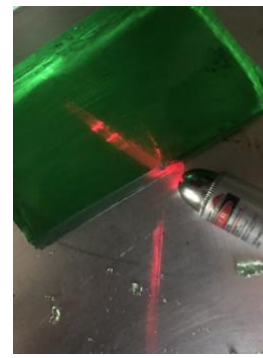


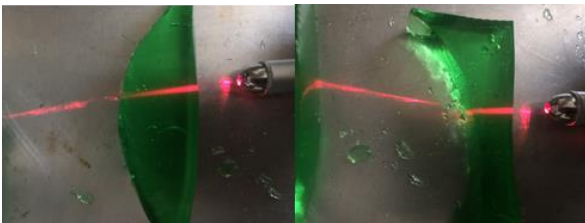
DIY Air Force Activities:

Lasers and Lenses



Materials:

- Jell-o mix (light colors like lime or lemon work best. You can also use plain, clear gelatin and add a flavor. Some recipes call for sugar)
- measuring cup
- cooking pot
- small cookie pan or baking dish
- plastic wrap
- spatula
- knife, glass, or cookie cutter
- laser pointer ******never point your laser pointer at your face/eyes or anyone else's!!!**



In our Simple Spectrometer DIY we talk about the electromagnetic spectrum, and how light is actually a wave of moving energy! A laser is a device that generates an intense beam of monochromatic (single color) light. They are used in research to deliver a specific burst of energy, as well as drilling, cutting, reading barcodes, and of course to play with our cats. Lenses give us the power to bend and manipulate light. This bending of light is called refraction. Some lenses bend light inward (convex) and some bend light away (concave). Light can be focused (concentrated) to specific points using different lenses. The distance between the lens and the place the light is focused to is called the focal length. The following experiment will allow you to begin to explore the vast world of lasers and lenses!

Directions:

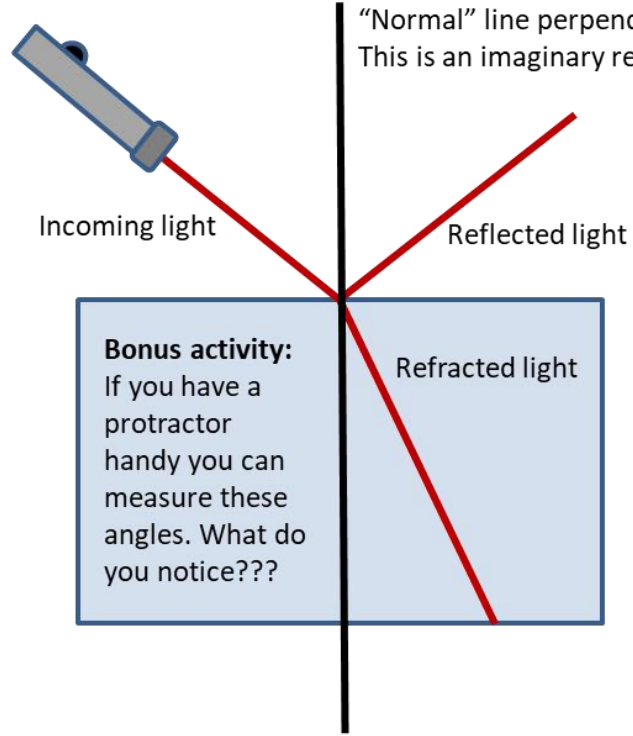
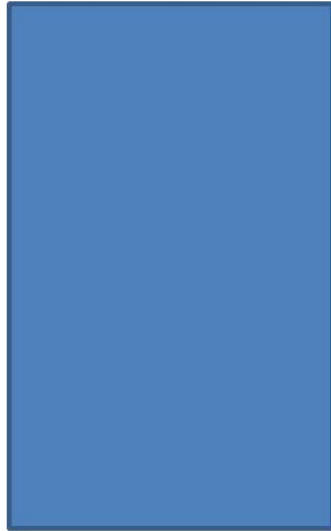
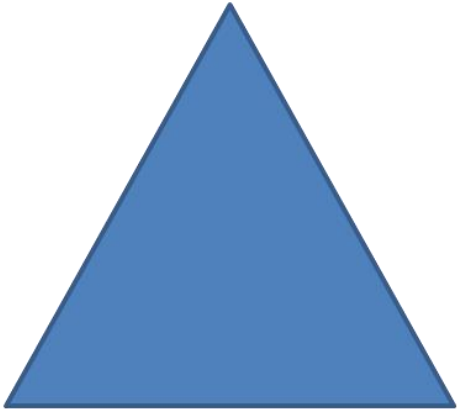
1. Line your cookie tray with plastic wrap, making it as smooth as possible!
2. Mix your gelatin according to the instructions on the box. **Ask an adult for assistance** as this requires boiling water! Pour the gelatin mixture carefully into your tray and place the tray in the fridge overnight so the gelatin sets. It must be very firm!
3. Carefully lift the Plastic wrap and gelatin out of the tray (ask for assistance). Use the templates on the back to cut out the different lens shapes using a knife (**ask an adult for assistance**), glass, or cookie cutter. Make the edges as smooth as possible, rough edges will cause the light to scatter.
4. Carefully lift your lenses with the spatula and place your shapes back on your tray.

The next part of the experiment works best in a dimly lit area. You can transport your shapes on the tray. Shine the laser pointer through your lenses. What do you observe? How does each lens behave differently? Now shine the laser through the rectangle and the triangle. These shapes will allow you to observe refraction! What do you see? How does the light bend? The light bends because it travels at different speeds through different substances. Imagine running down the beach, it would be more difficult to move through deep, loose sand, and even harder to run in the water! The light travels more slowly through the gelatin than the air! For more information search: Snell's law and index of refraction.

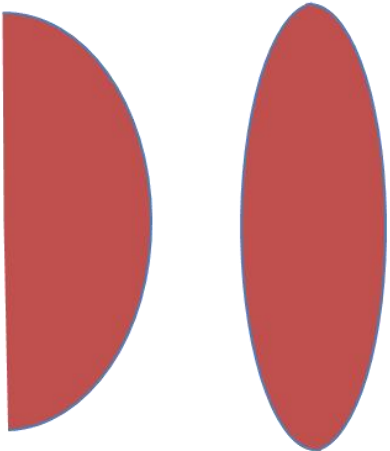
Air Force Associations:

Lasers play an essential role in communications and surveillance in addition to their use in the research laboratory. The Air Force Research Labs explore advanced high power laser sources. The Directed Energy and Electro-Optics for Space Superiority directorate performs atmospheric studies that result in high resolution images of objects in space!

Cut these out to explore how light refracts (bends).



Convex lenses: converging focus; light bends in



Concave lenses: diverging focus; light bends out

