DIY Spectroscope

STEM Lesson: Light is a fascinating concept. It is actually considered a wave that travels differently depending on the space that it is trying to get through. We see light in different colors based on the different wavelengths that our eyes pick up. The Electromagnetic Spectrum describes the various forms of light, the color of light associated with each wavelength, and their energy intensities. Red light has the longest wavelength, while blue and violet light have the shortest wavelength.

A spectroscope is a tool used to observe and measure the properties of light in the electromagnetic spectrum. Astrophysicists and astronomers use spectroscopes to analyze light as well as materials in space. A spectroscope uses diffraction, which is essentially separating light into its different colors based on their wavelength. When you look at a light source through a spectroscope, you will see each of the colors present in that source of light. White light contains all colors, so if you look at a white fluorescent light using your spectroscope, you will see a beautiful rainbow!

STEM Careers in the Spotlight:

1) **Astronomer:** Astronomers study the stars, planets, galaxies, and all objects that make up the universe. They use a variety of tools such as telescopes, spectroscopes, and computer models to help them better understand not only what makes up our universe, but how various celestial bodies interact with each other. They use a variety of STEM disciplines in their work such as physics, chemistry, geology, and biology to help them uncover the mysteries of our universe.
2) **Galactic archeologist:** A Galactic Archeologist is a type of astronomer who studies the composition of stars, planets, and other celestial bodies to better understand the evolution of the universe. They use images taken from advanced telescopes and computer models to uncover the elements a celestial body is made of and simulate how that celestial body was formed. They draw connections between physics, chemistry, geology, and computer science to help us get a better understanding of the origins of our universe.

Materials Needed:

- Linear diffraction gradients
- Cardboard tubes
- Construction paper
- 1 roll of Painters or Duct Tape

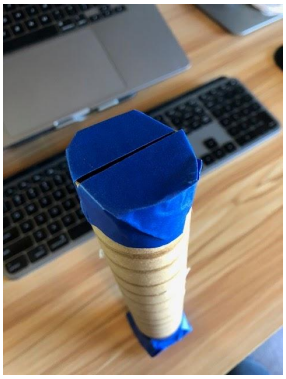
Activity Description:

Students will be making a spectroscope using cardboard tubes, a diffraction grating, and tape.

Activity Instructions:

1. Place and tape the linear gradient on one of the ends of the tube. Be sure to tape well for light not to enter through the sides.


2. On the other end of the tube, place two pieces of tape parallel to each other forming a slit in the middle.



3. Observe a light source such as an LED or light bulb. Be sure to look through the grating end of the spectroscope. The spectrum will appear off to the side from the slot. Rotate the circle with the slot until the spectrum is as wide as possible. **Note: Students should not observe the sun!** Only small light sources at an angle.
4. Customize your spectroscope by decorating it.