Western Engineering

Outreach

DIY Spectroscope
Grade K-2

Meet Today's ENG HERO!

Eric Johlin – **Assistant Professor with Western Engineering**

Dr. Eric Johlin is an Assistant Professor with the Mechanical and Materials Engineering Department at Western University. He has a Masters and a PhD in Mechanical Engineering! He did post-doctoral work for three years in Amsterdam at AMOLF's Center for Nanophotonics. Dr. Johlin's research mainly involves creating new devices with a particular focus on clean energy and photovoltaics.

To learn more about Dr. Johlin visit:

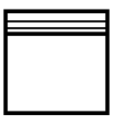
https://www.eng.uwo.ca/mechanical/faculty/johlin_e/index.html

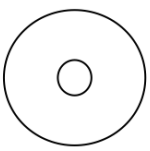
Learning Goal:

- Students will explore the physics of light
- Students will discuss about how light has energy and contributes to life on Earth
- Curriculum Connections: Grade 1 -Needs and Characteristics of Living Things; Energy in Our Lives

Materials Needed:

- Paper towel roll
- CD
- Scissors
- Cardstock
- Tape





Engineering and Science Connections:

Today, we will learn about light and its energy. Light allows us to see everything around us, and light is actually a spectrum of wavelengths extending from radio waves to gamma rays. This spectrum is called the electromagnetic spectrum, and in the middle of it we have visible light which is what we as humans can see.

Light Basics

When light is present, people can see objects. There are many sources of light, but the initial energy for all light sources comes from the sun. Light travels away from its source in straight lines through space as waves of energy. The waves we can detect with our eyes are called visible light. Light can pass through or bounce off objects. Additionally, different materials can block or absorb light. If an object blocks light, a shadow is formed!

The Spectrum

As stated above, light is a spectrum called the electromagnetic spectrum. There are seven main portions of this spectrum: radio, microwave, infrared, visible, ultraviolet, x-ray, gamma. Waves that are shorter have more energy, and waves that are longer have less energy. The light we can see as humans is called visible light is a very small portion of the electromagnetic spectrum.

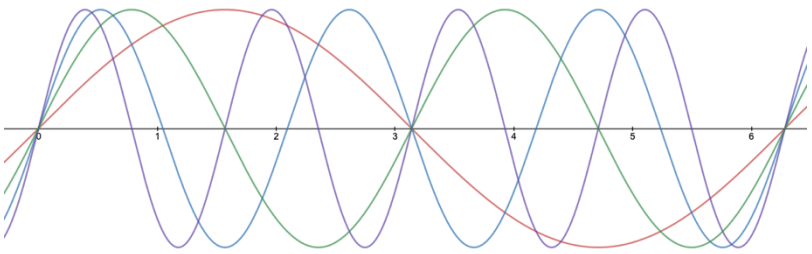
Lights, Energy, and Life

The sun is an extremely important part of our daily lives. It allows us to see, gives us warmth and gives plants energy to do photosynthesis. 99% of the sun's light is made up of three types: infrared, visible and ultraviolet light. Infrared light create heat, visible light allows us to see, and ultraviolet helps plants breath!

Rainbows

A rainbow is made up of seven colours: red, orange, yellow, green, blue, indigo and violet. These colours make up what is called visible light. Just like the rest of the electromagnetic spectrum, each colour has its own wavelength and energy. Red has the longest wavelength, and blue has the shortest wavelength. A rainbow is formed when the sun's light travels through a rain droplet and splits the light into its seven colours which we call a rainbow!

Fun Fact: Blue light is the kind of light emitted from our electronic devices. Being exposed to blue light before bed messes with your body's ability to fall asleep. This is why you should put your devices away at least one hour before bed!



Video Recommendation: *Light*

https://www.youtube.com/watch?v=d7yTlp4gBTI

DIY SPECTROSCOPE

Activity:

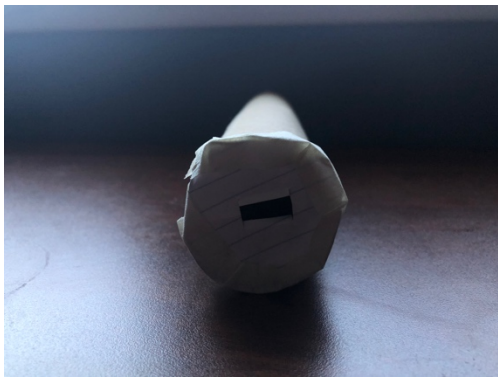
Before beginning, think about the following questions:

- What kind of light will this let us see?
- How many colours are in a rainbow?
- Which colour of the rainbow has the most energy?
- Which colour of the rainbow has the longest wavelength?
- Why does this let us see a rainbow?

Building your Spectroscope

- Use knife and/or scissors to cut a thin slit at a 45° angle toward the bottom of the cardboard tub
- Directly across from the slit, draw a rectangular peephole using a pen/pencil
- Then cut out the peephole using the knife/scissors

- Have student trace bottom of their tube onto their piece of cardstock
- Cut out the circle (cut slightly outside of the lines so that the circle won't be too small)
- Cut a small slit in the middle of the circle (this is easiest to do if you fold the circle in half and cut the hole from the middle, then unfold the circle)
- Insert disk into the 45-degree angle slit
- Now when you look through the peephole of your spectroscope, you should be able to see all the colours of the rainbow
    - Try and point it at the sky to get the best result (be careful not to point it at the sun)



What Did You Learn?

- What is light?
- That light is a spectrum
- That light carries energy that helps plants breath

Future Learning

- Try and alter this experiment! Different size slits and/or discs.
- Shine a flashlight through a glass prism and watch the seven colours appear
- Test this with regular lights. Is there a difference? Why or why not?
- Investigate how UV rays interact with your skin and connect this to why we wear sunscreen
- Look up photos of Niagara Falls and look at all the rainbows. Connect this to what you learned today!

Share your creations!

We would love to see what you made. Email as at discover@uwo.ca or tag us on social media.

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Thanks for discovering with us!