

STEM Kit – Students are made of star stuff?

The electromagnetic spectrum (basic)

<http://imagine.gsfc.nasa.gov/science/toolbox/emspectrum1.html>

discovering the electromagnetic spectrum

http://imagine.gsfc.nasa.gov/science/toolbox/history_multiwavelength1.html

This site will be used for the eclipse showing how NASA scientists use spectrometers to analyze the universe.

https://www.nasa.gov/pdf/479659main_LP8-AnalyzingSpectra_508.pdf

See attachment of Supernova worksheet that will be adapted to spectrum tubes ordered in kit.

<http://imagine.gsfc.nasa.gov/educators/lessons/supernova/>

<https://www.youtube.com/watch?v=HPcAWNIVl-8>

Students will investigate how scientists know what elements can be found on other planets/stars by learning more about the electromagnetic spectrum and the Periodic Table of the Elements. Students will use spectrometers to make observations of different elements (Spectrum Tubes) and how they interact with light waves. Using this information, students will learn more about the planets in our solar system and our Sun and will begin to recognize the common elements that make up the Universe.

Materials: (All materials could be checked out separately)

Spectrometers

Elements of the Universe Poster

Safe Spectrum Tubes (Co₂, air, N, H, H₂O)

Single Tube Power Supply

Spectrum Chart

Scott Earth Science Video “Our Sun” (this video will also be used in Activity #3)

Mysterious Liquid from area 51 activity (properties of water)

Elements, Compounds and Mixtures Kit (would be used as an introduction to the spectrum activity)

Total Cost of program: @\$600.00

Audience:

All materials in this program can be reused. These materials would be used in all 6th grade science classrooms at Mountain View Intermediate School (300 students). Students at Macon Middle School will be taking enrichment classes. I will be teaching this topic each 9-weeks to approx. 15-20 students (80 students/year). These materials could also be used by high school physics and chemistry teachers (TBD)

High School Physics

- 2.2.1 Analyze how energy is transmitted through waves, using the fundamental characteristics of waves: wavelength, period, frequency, amplitude, and wave velocity.
- 2.2.2 Analyze wave behaviors in terms of transmission, reflection, refraction and interference.
- 2.2.3 Compare mechanical and electromagnetic waves in terms of wave characteristics and behavior (specifically sound and light).

High School chemistry

- 1.1.3 Explain the emission of electromagnetic radiation in spectral form in terms of the Bohr model.

High School Physical Science

- 3.2.1 Explain the relationships among wave frequency, wave period, wave velocity and wavelength through calculation and investigation.
- 3.2.2 Compare waves (mechanical, electromagnetic, and surface) using their characteristics.
- 3.2.3 Classify waves as transverse or compressional (longitudinal).
- 3.2.4 Illustrate the wave interactions of reflection, refraction, diffraction, and interference.

7th Grade Science

- E.1.1 Compare the composition, properties and structure of Earth's atmosphere to include: mixtures of gases and differences in temperature and pressure within layers.

6th Grade Science

- E.1.2 Explain why Earth sustains life while other planets do not based on their properties (including types of surface, atmosphere and gravitational force) and location to the Sun.
- P.3.2 Explain the effects of electromagnetic waves on various materials to include absorption, scattering, and change in temperature.
- P.2.1 Recognize that all matter is made up of atoms and atoms of the same element are all alike, but are different from the atoms of other elements.
- P.1.2 Explain the relationship among visible light, the electromagnetic spectrum, and sight.