

1. NGSSS Benchmarks

- a. **SC.7.P.10.1** Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.
- b. **SC.7.P.10.2** Observe and explain that light can be reflected, refracted, and/or absorbed.
- c. **SC.8.E.5.11** Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.
- d. **SC.7.P.10.2** Observe and explain that light can be reflected, refracted, and/or absorbed.

2. Draw and label your own depiction of the Electromagnetic Spectrum. It should:

- a. show and list all seven major wave bands in order of wavelength and frequency (**7 points**, 1 for each major wave band);
- b. show all seven colors of visible light in order of wavelength and frequency (**7 points**, 1 for each color);
- c. depict the relationship among *wavelength*, *frequency*, and *energy* (**6 points**);
- d. depict or state the meanings of *wavelength* and *frequency* (**4 points**), and
- e. depict or state common uses for each wave (**7 points**).
- f. **Total: 30 points**

3. Draw and label models showing the behavior of light in various media (labeled as *opaque*, *translucent*, and/or *transparent*). Include arrows to depict the direction of light rays approaching and hitting the medium and its direction(s) after hitting the medium for:

- a. reflection (both types of reflection, including depiction of the *normal*) (**10 points**);
- b. refraction (including the *normal*) (**5 points**);
- c. absorption (**5 points**);
- d. transmission (**5 points**); and
- e. scattering (**5 points**).
- f. **Total: 30 Points**

4. Draw a model showing the differences, similarities and examples of *mechanical* and *electromagnetic* waves, including the relative speeds (fastest to slowest) of each type of wave in:
 - a. a vacuum,
 - b. gas,
 - c. liquid and
 - d. solid.
 - e. **Total: 30 points**

5. Neatness & Creativity: **10 points**:
 - a. Creativity means using ***your own ideas and imagination*** to show your understanding rather than copying models or diagrams you've seen before.
 - b. Neatness means making your models clear and easy for someone else to understand.

6. Extra Credit: Up to **5 points** for each in-depth inference or application that goes beyond what was taught in class.