HPS Electromagnetic Wave Review 2021 Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Objectives: Describe the composition and production of EM waves. (Obj 2)
Compare and contrast regions of the EM spectrum based on frequency, wavelength, and energy. (Obj 4) Describe the different behaviors of waves.

Visit the website and answer the questions:  <https://science.nasa.gov/ems/01_intro>

INTRODUCTION TO THE EM SPECTRUM

1. What are atmospheric windows?  Why do they exist?
2. Why is it necessary to have space-based instruments to study sources of high-energy radiation in space?

1. ANATOMY OF AN EM WAVE
2. How are EM waves created?  What do they carry?
3. Describe the nature of EM waves.  Use the key terms electric field and magnetic field.  Insert or draw a picture.
4. Why are different EM waves described in different terms?  ie. Radio and microwaves - frequency (Hz), infrared and visible light – wavelength (m), x-rays and gamma rays – energy (eV)
5. Describe the shortest and longest wavelengths of the EM spectrum according to the site.
6. WAVE BEHAVIORS
7. What can happen when light encounters an object?  What determines the behavior?
8. Describe reflection.  Draw a picture.  Give an example.
9. Describe absorption.  Draw a picture.  Give an example.
10. Describe diffraction.  Draw a picture.  Give an example.
11. Describe scatter.  Draw a picture.  Give an example.
12. Describe refraction.  Draw a picture.  Give an example.

Explore Refraction - Google “Wave on a String PhET”

1. Set the sim to pulse and fixed end. Set damping to 0 and tension to high. Send a single pulse and record your observations about the behavior of the pulse below.
2. Keep all other settings the same and set the sim to loose end. Record your observations about the behavior of the pulse below.

1. Keep all other settings the same and set the sim to no end. record your observation about the behavior of the pulse below.
2. \*Constructive Interference. Draw a picture. Give an example. (reference textbook)
3. \*Destructive Interference. Draw a picture. Give an example. (reference textbook)

 Explore Interference - Wave on a String PhET

1. Set the sim the same as Fixed End. Send a single pulse down the string. When that pulse is about halfway to the other end, send a second pulse.  Record your observations about the interaction between the two waves below. (Hint: you can pause the simulation and use the "step" button to view the interaction of the waves more slowly.)
2. Reset the sim and switch to Loose End. Send a single pulse down the string. When that pulse is about halfway to the other end, send a second pulse.  Record your observations about the interaction between the two waves below.