

The Energy of Electromagnetic Waves

Energy has a few different relationships with the electromagnetic spectrum. Frequency is directly tied to the energy of the EM wave. A higher frequency means more energy. A lower frequency means the EM wave carries less energy overall.

1. Spread out into the classroom and lab until you are far enough away to not touch anybody.
2. Slowly move your arm up and down with an amplitude of 1 foot.
3. Try to have a frequency of 0.5 hertz. *This means it should take about 2 seconds for your arm to go from the top to bottom and back up again to the top*
4. Double the frequency but keep the amplitude the same.
5. Notice how much more energy it takes to make the wave with the higher frequency

As energy is put into the system, it will also sometimes affect the amplitude of a wave. A bigger rock will make larger waves in water because it is putting more energy into the system. Seismic waves are another good example. A larger earthquake will create waves with a higher amplitude.

How do you think amplitude affects electromagnetic waves?

Light bulb demo

Observe the light from a 43 watt bulb and a 100 watt bulb.

- a. How are they different?
- b. How are they the same?
- c. What property of the light waves do you think causes the difference? Explain your answer.

After our discussion, correct and/or add to your answer.

[94] Comparing Colors

Follow the procedure for **Part B** on page F-31. The strip at the bottom of the box is sensitive to certain frequencies of light. This lab explores which frequencies and why

5. Sketch and/or describe

8. Record your observations

10. Discuss with your group instead

11. Describe/sketch below

14. Describe or sketch below

16. Record your results below

Analysis Questions

1. What colors of light made the strip glow? Which end of the visible light spectrum are these on?
2. Why do you think only these made the strip glow? Use your knowledge of wave properties.
3. Explain your results for the longer exposure time. Use your knowledge of wave properties.

Waves: I can show understanding of the characteristics and properties of waves

4 Highly Proficient	3 Proficient	2 Close to Proficient	1 Developing
<input type="checkbox"/> I can explain my results for longer exposure time using knowledge of wave properties.	<input type="checkbox"/> I can explain why only certain colors made the strip glow. <input type="checkbox"/> I can show knowledge of wave properties. <input type="checkbox"/> The lab is complete and most of the answers are correct.	<input type="checkbox"/> I can complete most of the lab. <input type="checkbox"/> My answers need more detail. <input type="checkbox"/> Some of my information may be <u>incorrect</u> .	<input type="checkbox"/> Not attempted or mostly incomplete.