

## Online Electromagnetic Spectrum Activity

Name: \_\_\_\_\_ PD: \_\_\_\_\_

Directions: Follow the links found in each of the activities listed below to complete the activities.

### Activity 1: Visible Light

Go to [Virtual Prism](http://www.sciencejoywagon.com/explrsci/media/prism.htm) <http://www.sciencejoywagon.com/explrsci/media/prism.htm>

1. Click on the button, "hold down for white light". **Describe what happens.**

Click on hand, move back and forth. (Note that a prism separates light into various wavelengths)

2. Identify the wavelength of the following colors:

blue light

yellow light

red light

### Activity 2: What Are Electromagnetic Waves?

[http://www.colorado.edu/physics/2000/waves\\_particles/index.html](http://www.colorado.edu/physics/2000/waves_particles/index.html)

3. What kinds of waves have wavelengths of:

about 1-200 meters

about  $1 \times 10^{-9}$  meters

4. What are the wavelengths of:

Microwaves

Visible light

Gamma rays

### Activity 3: Speed of Light

[http://www.colorado.edu/physics/2000/waves\\_particles/lightspeed-1.html](http://www.colorado.edu/physics/2000/waves_particles/lightspeed-1.html)

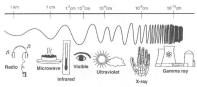
5. Pick three wavelengths, run the application and record the distance and time below:

\_\_\_\_\_

Divide your top number by the bottom number for each of these sets of numbers.

6. What is the approximate ratio for all of these?

7. Explain why this makes sense. (Think about the speed of light)



## Online Electromagnetic Spectrum Activity

Read through the rest of the web page.

8. What would be the wavelength of a radio wave of 90.1 mHz - SHOW YOUR WORK

9. What would be the wavelength of a radio wave of 98.3 MHz - SHOW YOUR WORK

### Activity 4: X-Rays

Click on the link for an interactive demonstration of an X-Ray machine [X-Rays](#)

<http://www.colorado.edu/physics/2000/xray/index.html>

10. Compare the number of bones in the finger and the thumb.

11. What is the visible human project?

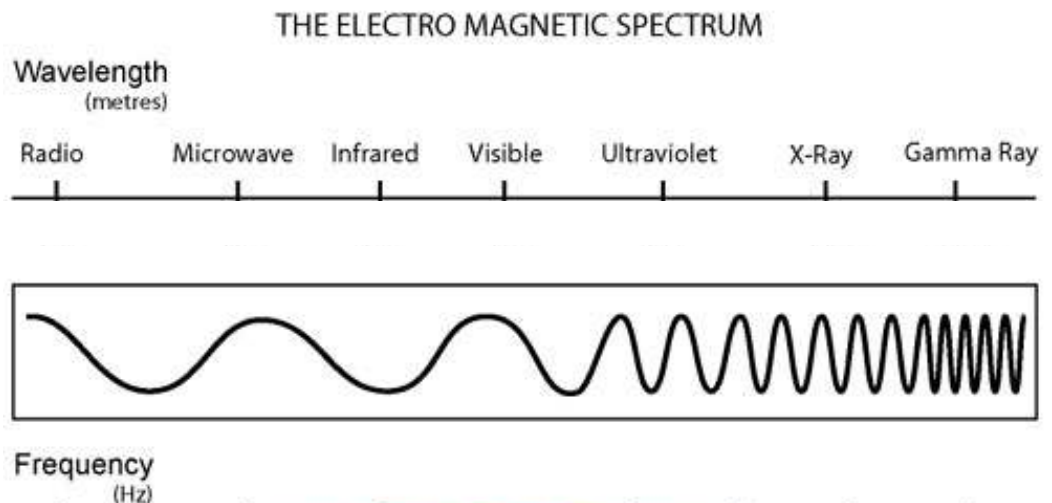
### Activity 5: The Electromagnetic Spectrum

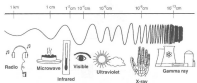
<http://lectureonline.cl.msu.edu/~mmp/applist/Spectrum/s.htm>

In this applet, you can click on the wavelength/frequency scale and change the wavelength and frequency by dragging the mouse around. You can also change the wavelength by using the arrow keys on your keyboard. Holding the shiftkey down while pressing the left or right arrow keys changes the wavelength by a factor of 10.

Add arrows to the picture below showing increasing or decreasing:

- Wavelength
- Frequency
- Total Energy





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12. What is the relationship between wavelength and frequency?

13. What type of waves have a wavelength of about a mile?

14. What type of electromagnetic radiation would be considered “safe” to be around, absorb?

15. Which color has:  
                         the highest frequency?                          lowest frequency?

### Activity 6: Tour the EM Spectrum

Follow the link: [http://missionscience.nasa.gov/ems/02\\_anatomy.html](http://missionscience.nasa.gov/ems/02_anatomy.html)

Find the 3 pictures of the dragonfly on the water wave.

16. How can you tell the wave has energy in it? (Answer in terms of work)

17. What is an electron volt (eV)

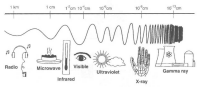
Click on the wave behaviors tab on the right side of the page.

18. How do we know the elevation on the surface of the moon?

### Activity 7: What is Spectroscopy

[http://coolcosmos.ipac.caltech.edu/cosmic\\_classroom/ir\\_tutorial/spec.html](http://coolcosmos.ipac.caltech.edu/cosmic_classroom/ir_tutorial/spec.html)

19. What is the difference between emission spectra and absorption spectra?



## Online Electromagnetic Spectrum Activity

Look at the **emission spectrum for the sun** and the **emission spectrum of hydrogen**

20. What do you notice about the two?

21. Label the 7 colors of the rainbow on the light spectrum below from looking at the webpage.



Violet

Red

22. Predict where the spectrum emission lines would appear from a “blacklight”.

23. When astronomers find new planets outside our solar system they can sometimes tell if there is an atmosphere and the composition of the atmosphere. **How do you think the astronomers can do this?** Use this link for help: <http://www.colorado.edu/physics/2000/quantumzone/index.html>

24. From your answers to the questions above, name the relationship between wavelength and frequency in waves that travel at the same velocity like the waves measured in these activities.