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Electromagnetic Spectrum WEBQUEST 1

1) Use the following web http://labman.phys.utk.edu/phys222core/modules/m6/The%20EM%20spectrum.html to choose a specific wavelength of visible light, a radio wave, and an x-ray to fill in the chart below. Remember your units!

Type of radiation	Wavelength	Frequency	Wave Speed

Use http://imagine.gsfc.nasa.gov/docs/science/know_l1/emspectrum.html for questions 2-5

2) What do all types of electromagnetic radiation have in common?

3) What is different about the different parts of the electromagnetic spectrum?

4) Which type of radiation has the most energy? How or where is this radiation formed?

5) Raphael refers to a wave by noting its wavelength. Lucinda refers to a wave by noting its frequency. Which student is correct and why?

Take the tour at http://science.hq.nasa.gov/kids/imagers/ems/waves3.html and answer questions 6-11

6) How does the energy of the different waves of the spectrum vary with frequency? With wavelength?

7) What is the frequency range of UV light? Of Infrared light?

8) If you are use night-vision goggles, what part of the spectrum are you detecting?

9) Rich says that light is the same thing as electromagnetic radiation. Do you agree or disagree with Rich? Explain your response.

10) Do all animals see the same frequencies of “visible” light as humans do? Do all animals hear the same frequencies of sound as humans do?

11) Why do astronomers use frequencies other than the visible ones when they are investigating the universe?

Use http://www.ntia.doc.gov/osmhome/allochrt.pdf to answer questions 12-14

12) What frequency range does the United States use for FM broadcasting? For AM broadcasting?

13) What frequency does television channel 7 broadcast at?

14) How large a band of frequencies does each television broadcasting channel get?

Use http://www.grg.northwestern.edu/projects/vss/docs/thermal/3-what-makes-em-radiation.html to answer the following (the general site http://www.grg.northwestern.edu/projects/vss/docs/Communications/2-more-about-radio-waves.html can also be used on other questions)

15) Why do materials absorb some frequencies of electromagnetic radiation and not others?

Electromagnetic Spectrum Webquest part 2

You will be using the following website: http://missionscience.nasa.gov/ems/01_intro.html to answer all of the questions below. Make sure you answer ALL questions to receive FULL CREDIT. The questions go in order with the webquest.

Read the Section “Introduction to the Electromagneic Spectrum (EMS)” and “Electromagnetic Energy”

Question 1: Provide an example of our everyday use of Electromagnetic Energy.

Question 2: Can the human eye detect the full range of the EMS?

Question 3: What are 3 types of harmful waves that our atmosphere protects us from?

Question 4: What are the regions of the spectrum with wavelengths that can pass through the atmosphere called?

Click on "Anatomy of an Electromagnetic Wave"

Question 5: Do Electromagnetic Waves need a medium to travel through?

Question 6: What did James Maxwell theorize about electromagnetic waves?

Questions 7: Who is Heinrich Hertz and what is he famous for?

Question 8: All light has what two types of properties?

Question 9: What are the 3 ways we describe electromagnetic energy?

Question 10: What is the name for the unit used to measure the energy of an electromagnetic wave?

Click on "Wave Behaviors" and define the following EMS terms:

11. Reflection:

12. Absorption:

13. Diffraction:

14. Scatter

15. Refraction:

Click on "Radio Waves" for the following questions:

Question 16: What is the height for radio waves compared to in the small spectrum picture at the top of the page, and what is the range in length for radio waves compared to? (read this in the paragraph)

Question 17: How do radio telescopes work?

Click on "Microwaves" to answer the following questions:

Question 18: Look at the wave scale at the top of the page: what is the relative size of a microwave?

Question 19: Why are microwaves beneficial to use for transmitting information?

Question 20: What is Radar used for?

Click on "Infrared" for the following questions.

Question 21: Look at the wave scale at the top of the page: what is the relative size of infrared waves?

Question 22: How were infrared waves discovered?

Question 23: What is thermal imaging and what is it used for?

Click on "Visible Light" to answer the following questions:

Question 24: What is the relative size of visible light waves?

Question 25: What color of visible light has the longest wavelength? And the shortest wavelength?

Question 26: What is Earth's natural form of visible light and what color is it?

Click on "Ultraviolet" to answer the following questions:

Question 27: Ultraviolet radiation has too small of a wavelength for humans to see. However, name one animal that can see ultraviolet radiation.

Question 28: What causes sunburns?

Question 29: What important layer in Earth's atmosphere is responsible for blocking ultraviolet radiation?

Click on "X-Rays" to answer the following questions:

Question 30: What is the relationship between wavelength and amount of energy?

Question 31: Why do bones show up on X-Rays?

Question 32: Where do X-ray telescopes have to be placed in order to view objects in space?

Click on "Gamma Rays" to answer the questions below:

Question 33: How are gamma rays generated?

Question 34: Compare Gamma Rays wavelength and energy to other forms of electromagnetic radiation.

Question 35: What is Compton Scattering?

Question 36: What is a Gamma Ray Burst and how much energy can it release?

For Extra Credit, answer Extension questions 16-17:

16) Why do waves with frequencies higher than visible light hurt us while those with lower frequencies do not affect us?

17) Light is sometimes described as a wave and sometimes as a particle. Give evidence to support the wave nature of light.