**Light Waves and Solar Energy**

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Q: Light is a wave??? Really???

 You have probably heard that light is a wave. But if you compare light to, say, a water wave, you quickly realize that the idea that light is a wave is really confusing. What does it mean to say that light is a wave??

To try to get a handle on this really weird idea, let’s use a website to help visualize the characteristics of light that scientists use when describing light as a wave. Please go to the website:

<http://amazing-space.stsci.edu/resources/explorations/light/index.html>

and click on the top link, “Catch the Waves”.

If you’ve ever had the chance to play around with a prism, you might have seen how regular “colorless” light can be turned into a rainbow. Or maybe you’ve even seen a rainbow itself…

You might be wondering, why does light make these rainbow colors?

Go through the first few pages on the “Catch the Waves” site and look at the rainbows. On the third page, you see a diagram of something called “The Electromagnetic Spectrum”.

Sketch and label the Electromagnetic Spectrum graphic in the space below.

For each of the identified regions of the electromagnetic spectrum, describe the size of the wave, and list one factoid about that type of light.

Radio-

Microwave-

Infrared-

Visible-

Ultraviolet-

X—Ray

Gamma Ray-

Move ahead to the next page and note that the Sun gives off lots of light that we can’t see… because we can only “see” light that is called “visible”. Cool, huh?

**Waves Carry Energy. Waves ARE Energy**.

Move forward to the next section of the website, entitled “Making Waves”. When you click on the “Making Waves” icon, you should see an interactive animation of a robot making waves with a string. I kid you not. Note that there is a ruler above the string, and a tab below the string that allows you to increase or decrease the amount of energy that is being carried by the waves that the robot creates.

Start with the energy all the way to the left, at its lowest setting. Let the robot make a wave, and then find the frequency and wavelength of that wave. Check your answer.

Start sliding the “Wave Energy” adjustment knob to the right, so that the waves increase in energy. What happens to the wavelength of the waves as the energy that they carry increases?

Set the energy knob all the way to the right, and find the wavelength and frequency of the wave when it is carrying the most energy.

The amount of energy carried by light (electromagnetic waves) can be determined by examining the wavelength and frequency of the light. Summarize what you learned about the relationships between light energy, wavelength, and frequency in the space below:

Light with a large wavelength has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy compared to light with a short wavelength.

Light with a high frequency has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy compared to light with a low frequency.

Ultraviolet light from the sun has a higher frequency and shorter wavelength than visible light. Do you think that ultraviolet light carried more energy, or less energy, than visible light?

Why do you think that you should wear sunblock that specifically blocks UV rays?