Name_____

LIGHT WAVES

Directions: Read the information below.

Light Waves

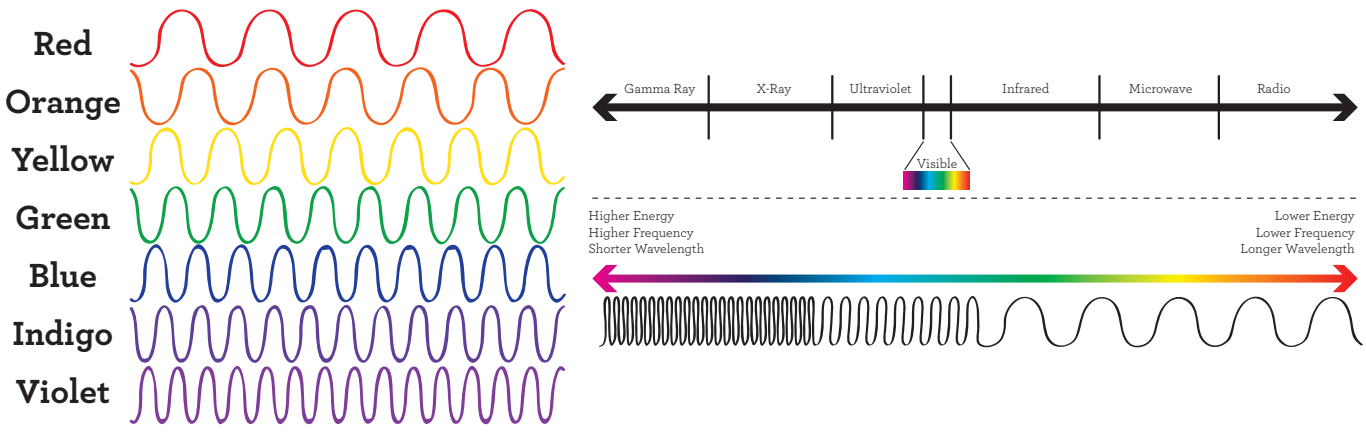
Have you ever thought about the color of the sky? When we look up on a sunny day, it appears blue. When we look at that same sky from the perspective of an astronaut in space, it appears black. Why is that? The truth is, the answer is complex but it all has to do with the electromagnetic waves that our eyes perceive.

All light is made up of electromagnetic waves. The electromagnetic spectrum includes the lowest-frequency waves (radio waves) to the highest-frequency waves (gamma rays). All waves, including radio waves, microwaves, and x-rays, are on the electromagnetic spectrum. Humans are only able to see a small portion of that spectrum: visible light.

Light waves are described by their frequency and wavelength. Wavelength is the distance from one peak to the next. You can see in the illustration of the color waves that there are high points (peaks) and low points (troughs). The distance between high peaks is measured as wavelengths. Frequency is the number of wavelengths that pass every second. Frequency and wavelength have a negative association, or an inverse relationship. This means as the wavelength increases the frequency decreases. Try this for yourself. Use a pipe cleaner or folded paper to create wavy lines. Hold your finger still and pass the waves across your finger, counting roughly how many wavelengths per second passed by. Now change the waves to have even shorter wavelengths. Try it again and notice how moving the waves at the same speed will increase the frequency – all just by decreasing the wavelength.

In real life, these changes result in different colors. As the illustration depicts, red has the largest wavelength (and lowest frequency) of all colors. Which color has the highest frequency? An increase in frequency results in an increase in energy. Therefore, we would expect it to follow that violet colors carry the most energy with them.

When we see an object, however, its color is not really what we perceive. In other words, a red notebook is really not red. In fact, a red notebook appears to be that color because it is actually absorbing all the colors except red. That's the color that is not absorbed and thus gets reflected back to our eyes. A blue shirt only appears to be that color because it absorbs every other color wave except blue. Some special exceptions to this rule are the colors white and black. A white shirt does not absorb any colors and reflects them all back. A black shirt absorbs all colors, reflecting nothing back. Because color waves are turned into heat energy, people are advised to wear light-colored clothing while out in the sun.



Directions: Answer the questions below.

1. In your own words, what are light waves?
2. Pretend you're outside and see an orange car. Use the space below to draw the car and sketch what is happening with the light waves to make that car appear orange.
3. Now pretend you see a black car. Repeat the process and show what the waves would look like.

Directions: As your class performs the experiment, record the results and your observations below.

	Plastic Wrap	Rubber Sheet	White Paper
Red			
Blue			
Green			
Yellow			
Clear			

Based on your findings, what conclusion can you make?