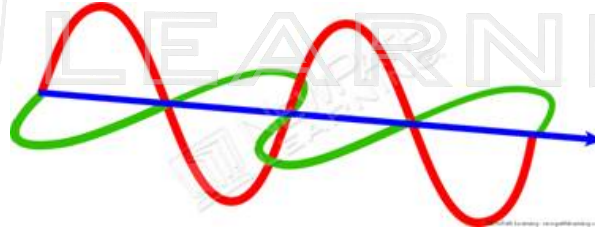


LIGHT

Overview

An **electromagnetic wave** is made up of vibrating electrical and magnetic fields that travel as quickly as light. Unlike many other types of waves, electromagnetic waves do not require a **medium** to pass through.



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PREVIEW

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Explain the two models for electromagnetic waves.

Wave Speed

The speed of an electromagnetic wave is calculated by multiplying the wavelength by the frequency. In a vacuum, all electromagnetic waves travel at the same speed even though they have different wavelengths. The variations in wavelength are compensated by variations in frequency leaving the speed the same.

The diagram below shows the **electromagnetic spectrum** or complete range of all electromagnetic wavelengths.



The diagram above shows the various types of electromagnetic radiation and the differences in their wavelengths and frequencies. Notice that the radio waves on the left have larger wavelengths and lower frequencies while the gamma rays on the far right, have shorter wavelengths and greater frequencies.

LESSON CHECKPOINT

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LESSON CHECKPOINT: How do these differences in wavelengths result in seeing different colors?

When light hits an object, it either goes through easily, partially, or not at all. An object that lets *most* of the light through is said to be **transparent**. An example would be a window. Objects that allow only *some* light to get through are called **translucent**. An example of this is frosted glass. An **opaque** object prevents *all* light from getting through it and an example would be a solid brick wall.

LESSON CHECKPOINT: What is the difference between transparent, translucent, and opaque objects?

Colors

The colors we see depend upon which wavelengths of visible light get reflected on a surface. The color of an object depends on the wavelength of light that it reflects. For example, a red object reflects red light and absorbs all other colors. A white object reflects all colors of light. A black object absorbs all colors of light.



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LESSON CHECKPOINT: Explain how the makeup of light causes us to see different colors.