

EM Spectrum Lesson

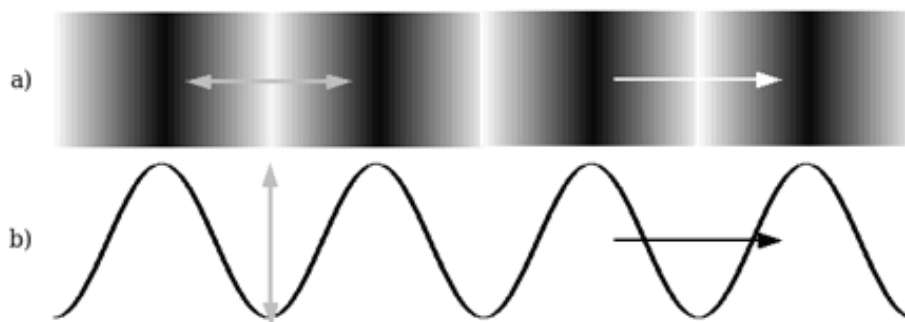
Have students begin by brainstorming all the types of waves they can think of and/or all the contexts in which the term wave is used. A partial list may include: water waves, doing “the wave” at a ball stadium, waving good-bye, sound waves, radio waves, etc.

Note that each instance relates to a repeated or periodic motion. Define the term wave.

Definition: A **wave** is a disturbance that transfers energy from one location to another. Waves are used to model a variety of things in the natural world.

Waves can be categorized based on how they move. Two types of waves are discussed below.

Longitudinal Waves (a) and Transverse Waves (b)¹



Longitudinal Waves (a) — the medium vibrates parallel to the propagation of the wave itself.

Transverse Waves (b) — the medium vibrates perpendicular to the propagation of the wave itself.

Both types of waves can be generated with a slinky to illustrate this concept.

The peaks of the longitudinal waves are called crests and the low points are called troughs. The distance from crest to crest or trough to trough is known as the wavelength.

To calculate the speed of a wave (in m/s), multiply its frequency (in Hertz) and its wavelength (in meters).

EM Waves

Waves in the electromagnetic spectrum are best modeled by transverse waves. Another characteristic of EM waves is that they do not require a physical medium to travel through (unlike mechanical waves such as water waves and sound waves).

Below is a diagram of the electromagnetic spectrum.

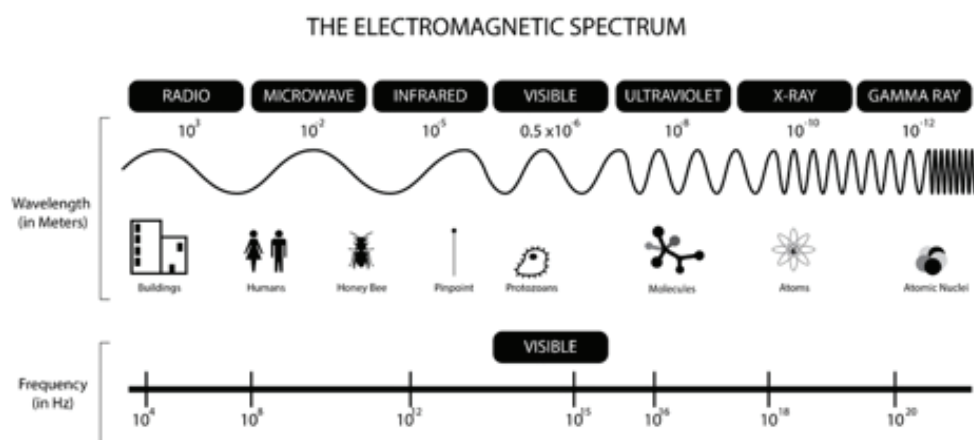


Diagram Sources:

¹https://commons.wikimedia.org/wiki/Category:Longitudinal_wave#/media/File:Longitudinalwelle_Transversalwelle.png

²https://commons.wikimedia.org/wiki/File:BW_EM_spectrum.png