Flipping Physics Lecture Notes: *Waves Introduction*
https://www.flippingphysics.com/waves.html

When one thinks of "waves" the most common visual which probably comes to mind is waves moving across a body of water like a lake or an ocean. A water wave is most definitely an example of a wave, however, there are many more. Sound waves are how you are currently hearing me, visible light is an electromagnetic wave and is how you see me, radio waves are also an electromagnetic wave and are likely how your electronic device is receiving this video, seismic waves are waves of energy which travel through the Earth's crust, and waves on a string are electrical potential energy stored in the string being transferred from one location to another.

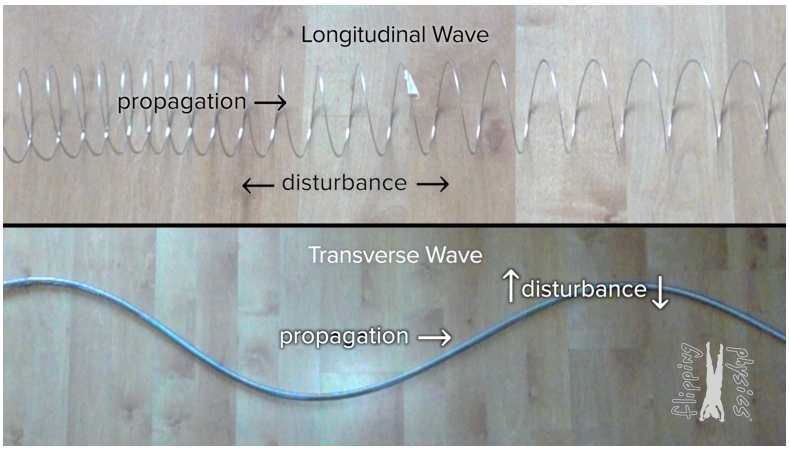
Please note that electromagnetic waves are not mechanical waves and do not require a medium to travel through. Visible light and radio waves are components of the electromagnetic wave spectrum. We will discuss these concepts in detail in later lessons. This lesson is about mechanical waves.

A mechanical wave is a disturbance of a medium which travels through the medium transferring energy from one place to another. Please realize waves transfer energy from one location to another, they do not move matter from one location to another. Wave motion is the motion of the disturbance of the medium, not the motion of the medium itself.

We will use waves on a spring to show the properties of mechanical waves. We will start with a single wave pulse traveling through the spring. The piece of tape which is on the spring is a part of the medium because it is attached to the spring. As the wave pulse travels along the spring, the tape moves up and then down, however, the overall displacement of the piece of tape is zero, because the medium does not change locations. The energy is contained in the disturbance of the medium travels along the spring. In other words, the wave is a pulse of energy traveling through the medium. The larger the amplitude of the wave, the more energy contained in the wave. Amplitude being the maximum displacement of the wave from equilibrium position. Equilibrium position being the position of the medium before and after the wave bases by that point.

A wave pulse is a single disturbance of a medium, whereas a periodic wave is a connected series of wave pulses. A periodic wave is also sometimes called a continuous wave.

Waves can be classified as either transverse or longitudinal. A transverse wave is where the direction of wave propagation is perpendicular to the direction of the disturbance of the medium. Transverse means "in a position or direction that is at an angle of 90° to something else"[1]. A longitudinal wave is where the direction of wave propagation is parallel to the direction of the disturbance of the medium. Longitudinal means "lengthwise[2]" or "in the direction of the longest side[3]" which means parallel. (Note: The only difference between the definitions of transverse and longitudinal wave is transverse uses "perpendicular" and longitudinal uses "parallel.")



[1] https://dictionary.cambridge.org/us/dictionary/english/transverse
[2] https://dictionary.cambridge.org/us/dictionary/english/longitudinal
[3] https://dictionary.cambridge.org/us/dictionary/english/lengthwise