

Physics for Kids

Waves

What is a wave?

When we think of the word "wave" we usually picture someone moving their hand back and forth to say hello or maybe we think of a [curling wall of water](#) moving in from the ocean to crash on the beach.

In physics, a wave is a disturbance that travels through space and matter transferring [energy](#) from one place to another. When studying waves it's important to remember that they transfer energy, not matter.

Waves in Everyday Life

There are lots of waves all around us in everyday life. Sound is a type of wave that moves through matter and then vibrates our eardrums so we can hear. Light is a special kind of wave that is made up of photons. You can drop a rock into a pond and see waves form in the water. We even use waves (microwaves) to cook our food really fast.



Types of Waves

Waves can be divided into various categories depending on their characteristics. Below we describe some of the different terms that scientists use to describe waves.

Mechanical Waves and Electromagnetic Waves

All waves can be categorized as either mechanical or electromagnetic.

Mechanical waves are waves that require a medium. This means that they have to have some sort of matter to travel through. These waves travel when molecules in the medium collide with each other passing on energy. One example of a mechanical wave is sound. Sound can travel through air, water, or solids, but it can't travel through a vacuum. It needs the medium to help it travel. Other examples include water waves, seismic waves, and waves traveling through a spring.

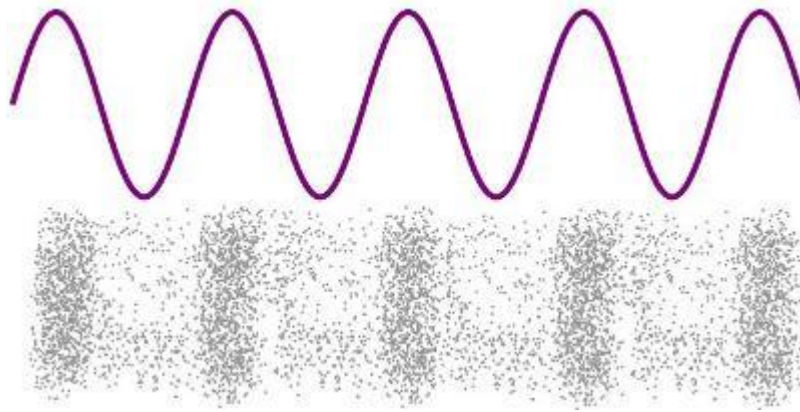
Electromagnetic waves are waves that can travel through a vacuum (empty space). They don't need a medium or matter. They travel through electrical and magnetic fields that are generated by charged particles. Examples of electromagnetic waves include light, microwaves, radio waves, and X-rays.

Transverse Waves and Longitudinal Waves

Another way to describe a wave is by the direction that its disturbance is traveling.

Transverse waves are waves where the disturbance moves perpendicular to the direction of the wave. You can think of the wave moving left to right, while the disturbance moves up and down. One example of a transverse wave is a water wave where the water moves up and down as the wave passes through the ocean. Other examples include an oscillating string and a wave of fans in a stadium (the people move up and down while the wave moves around the stadium).

Longitudinal waves are waves where the disturbance moves in the same direction as the wave. One example of this is a wave moving through a stretched out slinky or spring. If you compress one portion of the slinky and let go, the wave will move left to right. At the same time, the disturbance (which is the coils of the springs moving), will also move left to right. Another classic example of a longitudinal wave is sound. As sound waves propagate through a medium, the [molecules](#) collide with each other in the same direction as the sound is moving.



In the above picture the top wave is transverse and the bottom wave is longitudinal.

Interesting Facts about Waves

- Waves in the ocean are mostly generated by the wind moving across the ocean surface.
- The "medium" is the substance or material that carries a mechanical wave.
- One of the most important things to remember about waves is that they transport energy, not matter. This makes them different from other phenomenon in physics.
- Many waves cannot be seen such as microwaves and radio waves.
- The tallest ocean wave ever recorded was 1,720 feet tall and occurred in Lituya Bay in Alaska.

Activities

Take a ten question [quiz](#) about this page.