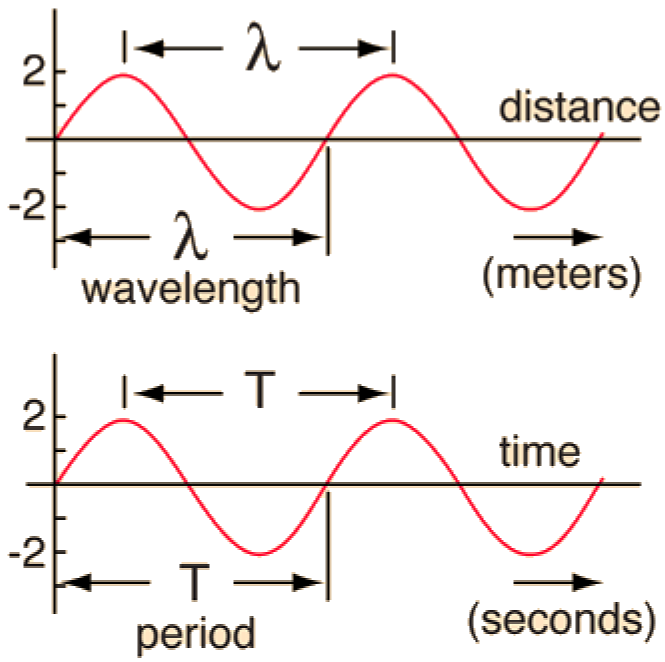
Wave motion

Many simple repetitive actions: motion of pendulum, bobbing of spring, waves in the sea … are described as waves and in simplest form given by a sine wave

A (amplitude) =C sin($2\pi t/T$) if repetitive in time: T is period, or frequency $f=1/T$

A= C sin ($2\pi x/\lambda$) repetitive in space. λ is wavelength



Moves with velocity $V = f\lambda$ m/s

Transverse waves. Amplitude of motion is perpendicular to direction wave is moving.

The wave advances one wavelength λ while the float executes one period T. The relationship

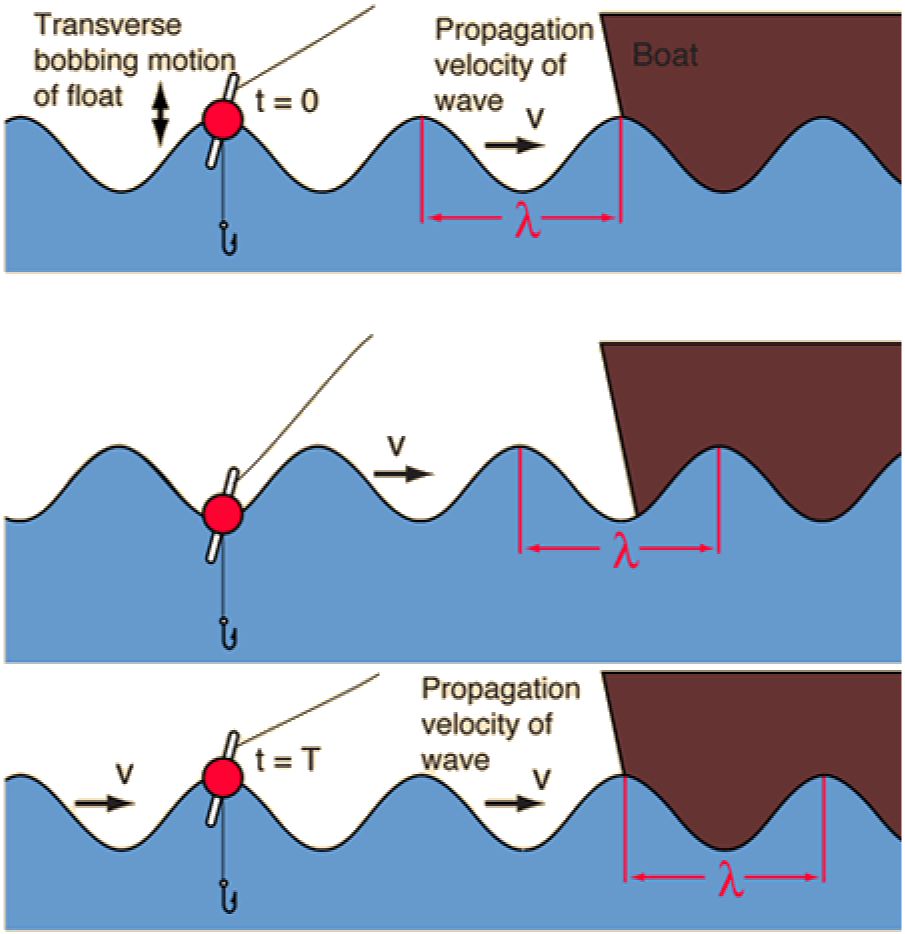
$$\lambda = vT$$

along with

$$T = 1/f$$

gives the usual form of the wave relationship

$$v = f\lambda$$

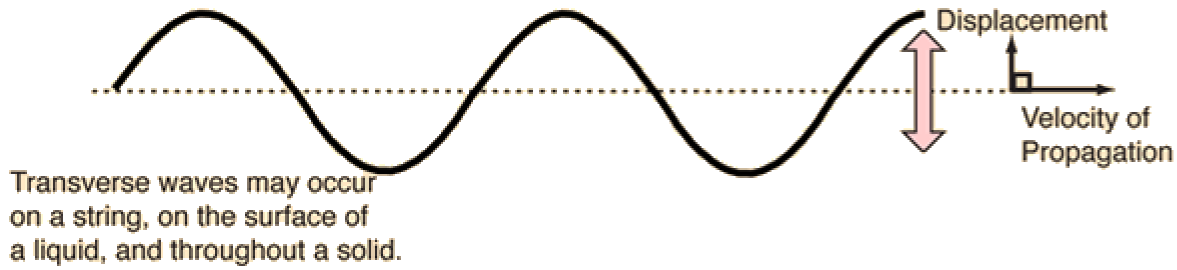


Travelling waves

Drop pebble in pond. Waves travel outward

Transverse Waves

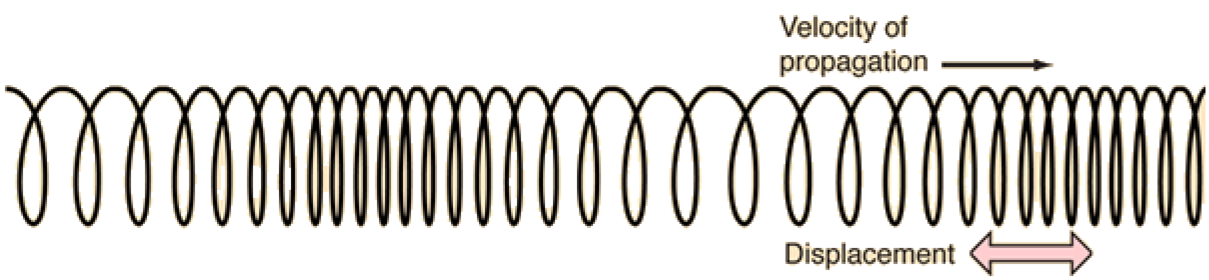
For transverse waves the displacement of the medium is perpendicular to the direction of propagation of the wave. A ripple on a pond and a wave on a string are easily visualized transverse waves.

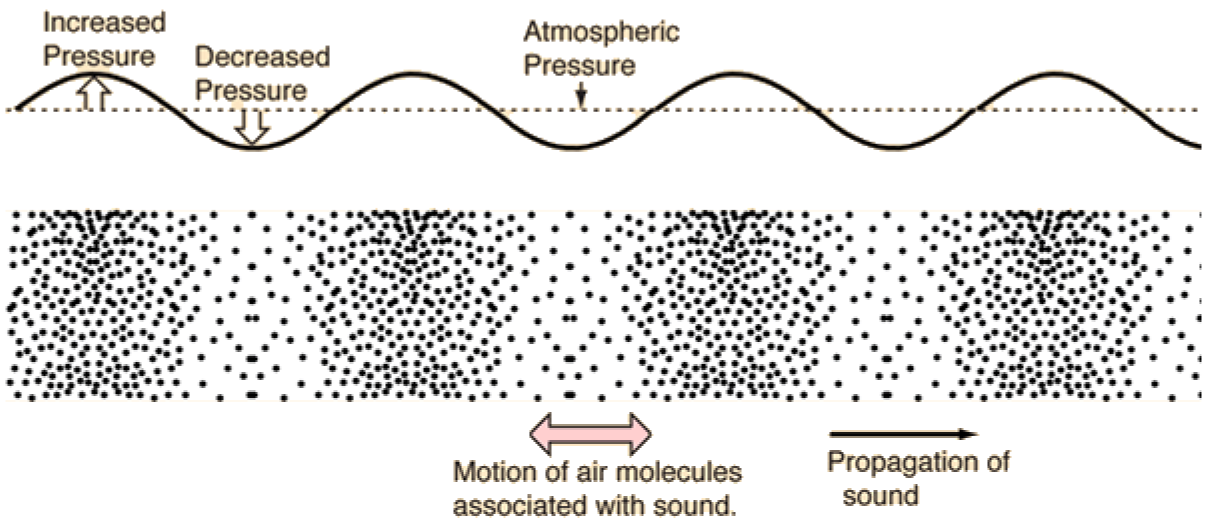


Transverse waves cannot propagate in a gas or a liquid because there is no mechanism for driving motion perpendicular to the propagation of the wave.

Longitudinal Waves

In longitudinal waves the displacement of the medium is parallel to the propagation of the wave. A wave in a "slinky" is a good visualization. Sound waves in air are longitudinal waves.





Increased Pressure
Decreased Pressure
Atmospheric Pressure
Motion of air molecules associated with sound.
Propagation of sound