$$f = \frac{1}{T} \qquad [Hz]$$

Frequency is recipricol of period

Damped Oscillation

Damped oscillation is an oscillation that gradually decreases, generally due to friction in the mechanism.

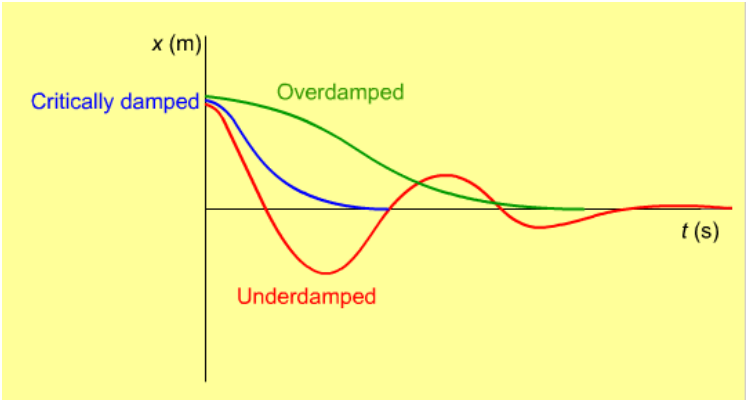
There are three levels of damped oscillation:

http://demonstrations.wolfram.com/DampingInRLCCircuits/

Under Damped: small amount of friction, oscillations happen but the amplitude gradually decreases

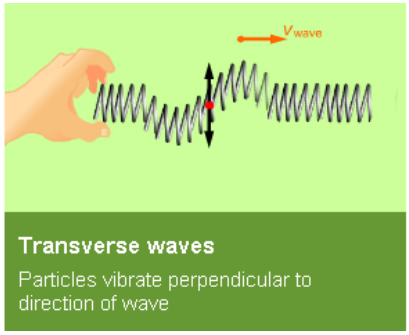
Critically Damped: the perfect amount of friction, object just goes straight to equilibrium but in basically the same way it would if undamped.

Over Damped: Lots of friction, it takes the object much longer to reach equilibrium because it has to fight the friction.

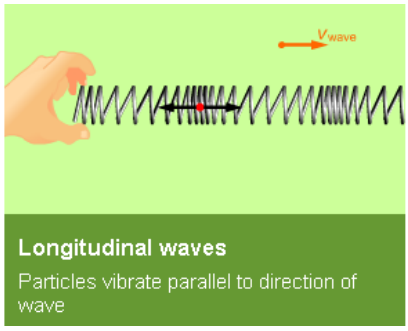


Transverse vs Longitudinal Waves

Transverse: particles move perpendicular to motion of wave.



Longitudinal: Particles move parallel to motion of wave. (Compression Wave)



Sound

Wave Speed

Different waves travel at different speeds depending on the medium they are moving through and what is causing the wave.

$$v = \frac{\lambda}{T} = \lambda f$$ units: m/s

λ = wavelength

T = period

f = frequency

Speed of light: 3×10^8 m/s

Speed of sound: 343 m/s

if a wave is traveling @ 1.2 m/s, what is the speed of a single particle in the wave?

light wave $\lambda = 520\ nm$

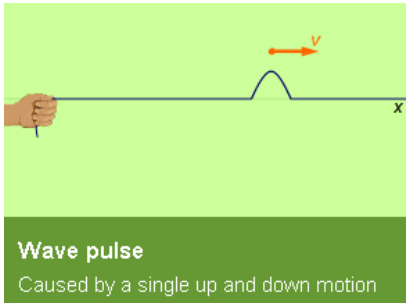
$f = ?$ $\lambda = 520 \times 10^{-9}\ m$

$v = \lambda f$ $V_{light} = 3 \cdot 10^{8}\ m/s$

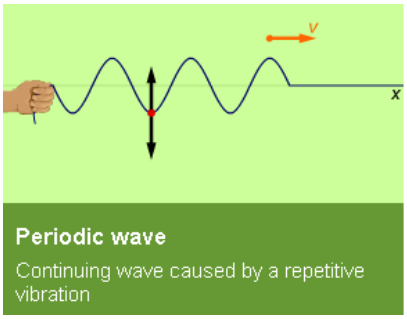
$3 \cdot 10^{8} = 520 \times 10^{-9} \cdot f$

$\boxed{f = 5.8 \times 10^{14}\ Hz}$

Wave Pulse: A single peak



Periodic Wave: a continuous oscillation

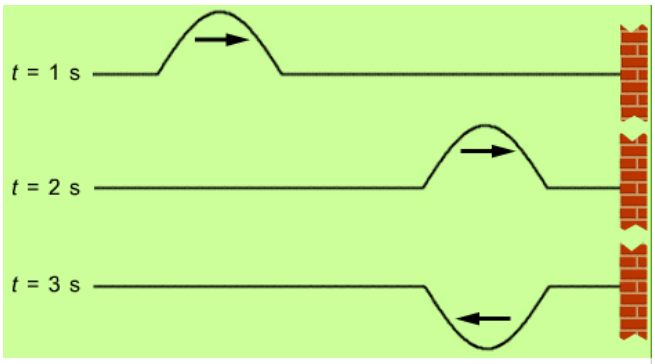


this assumes that the medium continues for ever

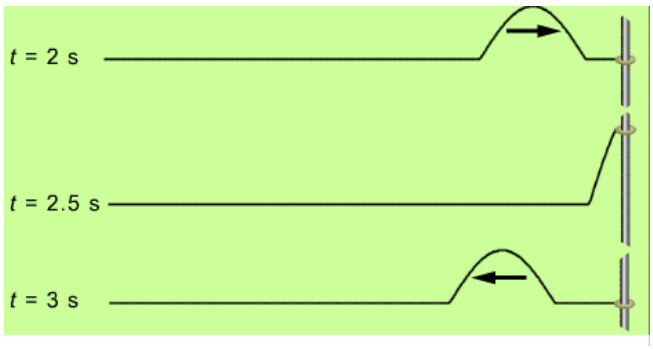
But when the medium ends, interesting things happen and different things happen if the end is fixed or unfixed.

When a wave meets a barrier, things happen

Fixed end:



Un-Fixed End:

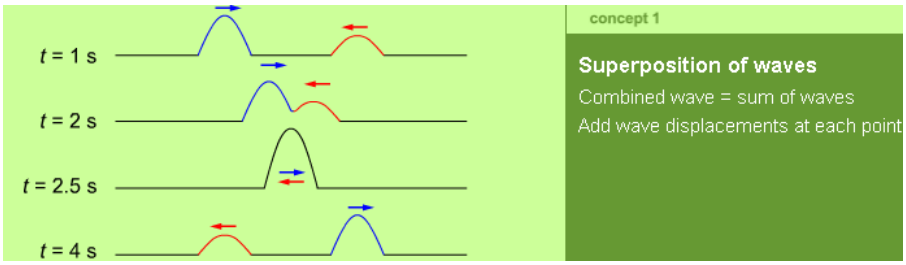


The Principle of Superposition

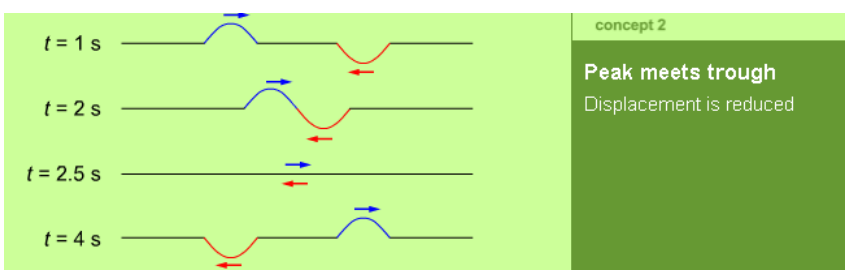
When two waves pass by each other they combine, this is called superposition.

Let's play with this some:
in the real world and in physicstopia

Constructive Interference:



Destructive Interference:



Standing Waves

A standing wave is a wave that does not travel

Let's try to make one:
in the real world and in physicstopia

A standing wave is created by two identical waves traveling in opposite directions.

In a string of fixed length, there are multiple types of standing waves that can be produced

What can you say about the relationship between the harmonic, the wavelength and the speed of the wave?