

**PHYSICS****WAVE INTERFERENCE AND SOUND**INTERFERENCE OF PULSES AND WAVES

Wave interference occurs when pulses move past one another. During the overlapping of the two wave pulses, the amplitudes of the waves are added together, resulting in *constructive* or *destructive* interference.

Destructive Interference

For transverse waves, destructive interference occurs when a crest meets a trough.

For longitudinal waves, destructive interference occurs when a compression meets a rarefaction.

Before:

During:

After:



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Constructive Interference

For transverse waves, constructive interference occurs when a crest meets a crest, or a trough meets a trough.

For longitudinal waves, constructive interference occurs when a compression meets a compression, or a rarefaction meets a rarefaction.

_____ *Before* _____

_____ *During* _____

_____ *After* _____

Principle of Superposition

The resulting displacement of two interfering pulses or waves is the algebraic sum of the displacements of the individual pulses or waves.

Waveform: The instantaneous displacement of interfering waves.

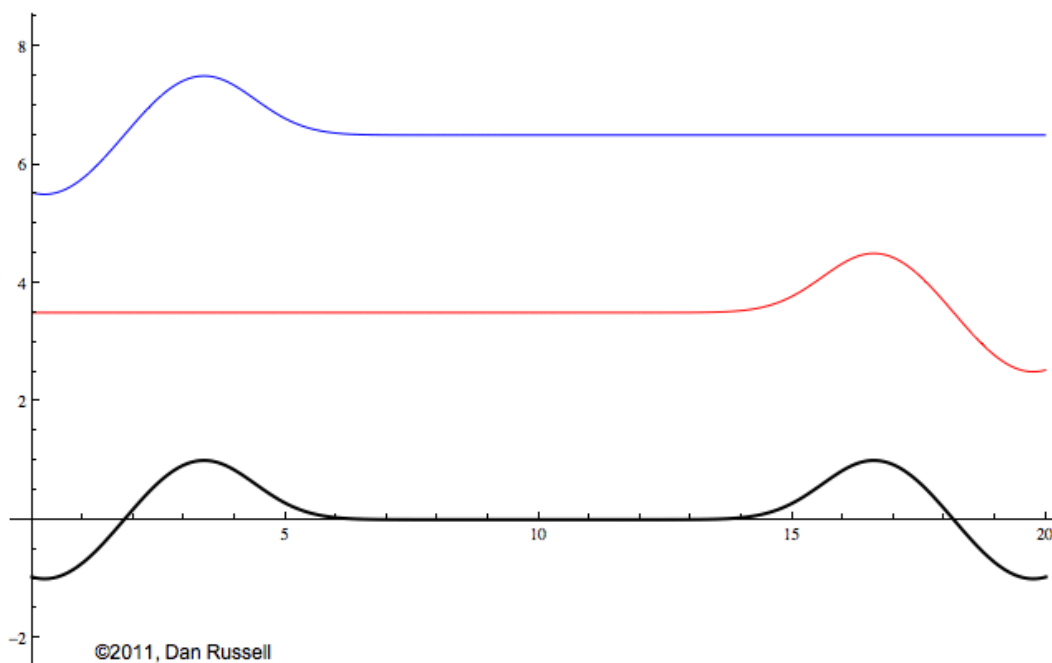
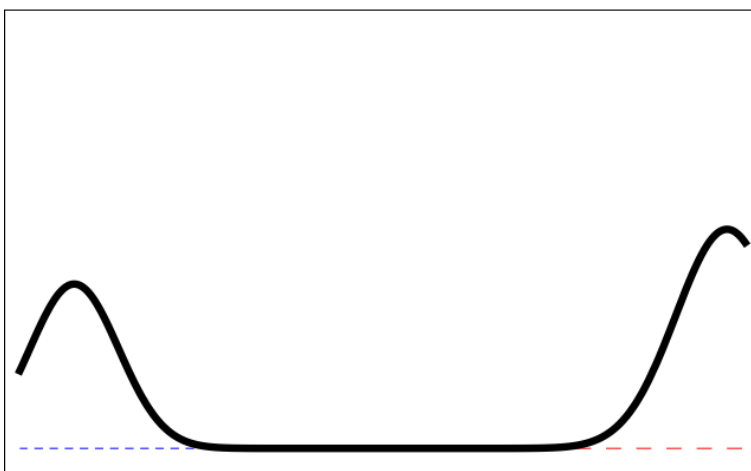
Ex: What would be the amplitude of a waveform that results from the constructive interference of a 2 m wave pulse and a 3 m wave pulse?



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Principle of Superposition





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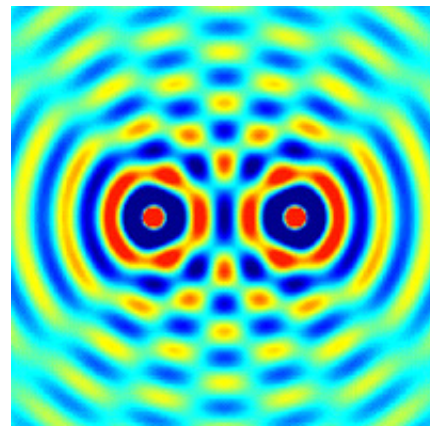
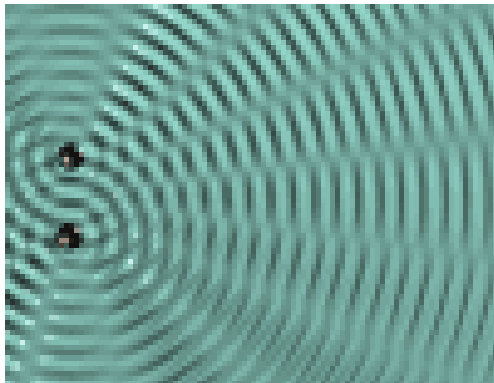
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Standing Wave Pattern (A form of interference)

A standing wave pattern occurs when wave pulses bounce off of something and reflect back on themselves. This causes a pattern of constructive and destructive interference. However, the patterns can also be created if two sources produce the exact same waves and those waves interact with each other (speakers).

Throughout the standing wave pattern, there are **NODES** (areas of destructive interference) and **ANTINODES** or **LOOPS** (areas of constructive interference).

In terms of sound waves, these NODAL areas would correspond to a dead zone, or an area with no sound; while the areas with antinodes would be much louder.



**PHYSICS****WAVE INTERFERENCE AND SOUND****SOUND****Definition:****Properties of Sound:**

- 1.
- 2.
- 3.

Sounds travel at different speed in different mediums. Since the molecules of a solid are packed closer together than the molecules of a gas, sound will travel **FASTER** in a solid than it will a gas.

The average range of human hearing is from 20 Hz to 20 000 Hz.

Infrasonic -

Ultrasonic -

<http://www.youtube.com/watch?v=cvBtQmY2B5I&feature=endscreen&NR=1>

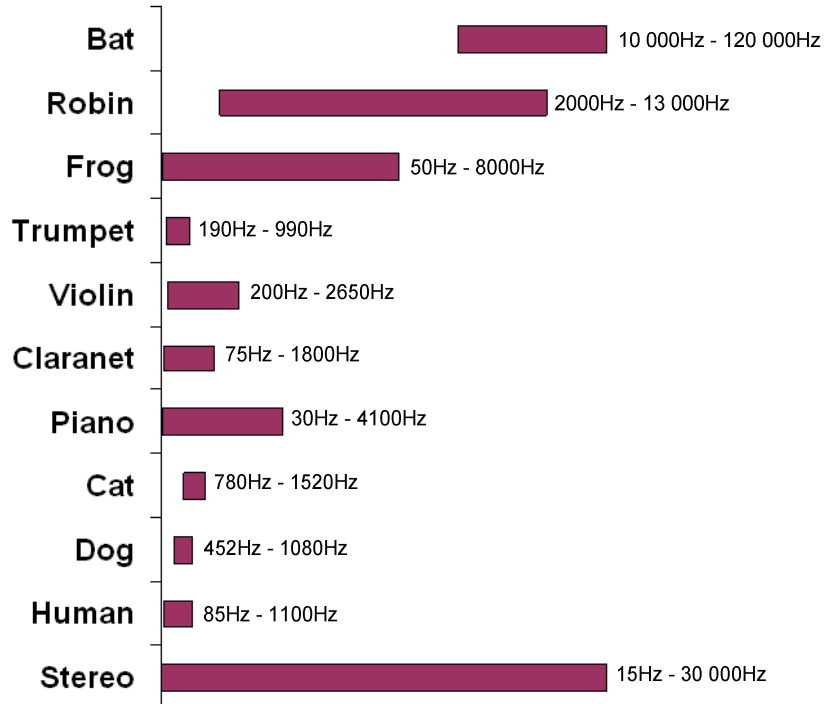
<http://www.youtube.com/watch?v=h5I4Rt4OI7M>



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RANGE OF TRANSMITTED SOUND



RANGE OF HEARING

