



Flipping Physics Lecture Notes:

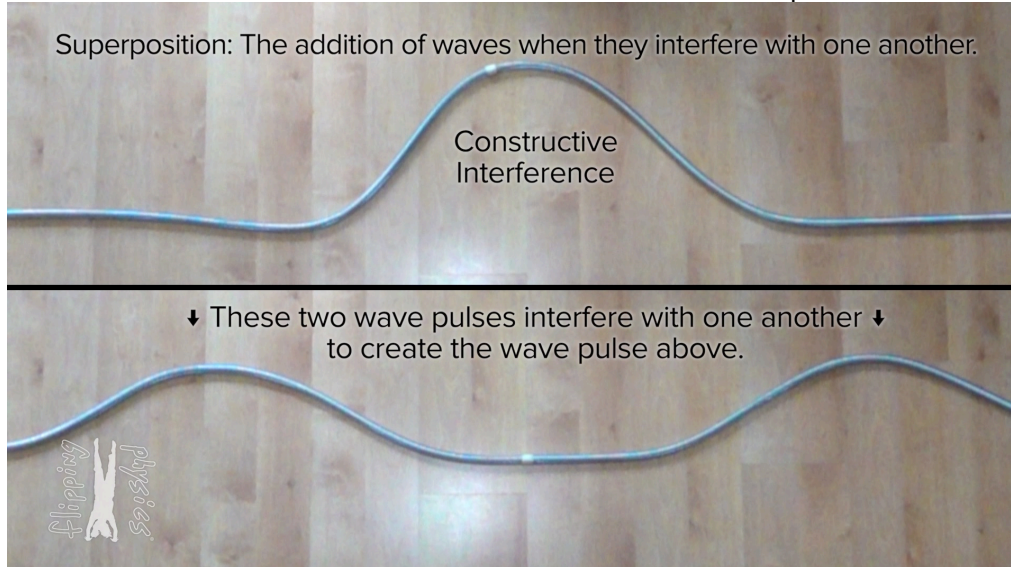
Wave Superposition Introduction

<https://www.flippingphysics.com/wave-superposition.html>

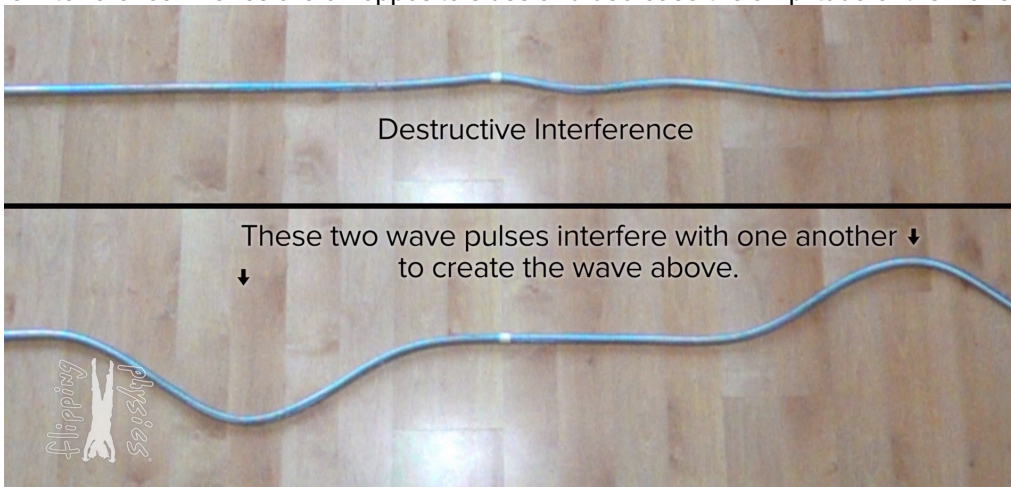
It is a rather well-established fact that two objects cannot occupy the same space at the same time. However, waves are not objects. Waves are a disturbance of a medium which travels through the medium transferring energy from one place to another. Which means waves *can* occupy the same space at the same time. In fact, waves pass right through one another and when they occupy the same space, they interfere with one another via what is called superposition.

Superposition simply means the amplitudes of the waves are combined. For example, if the two waves are on the same side of the spring, the two waves pulses will combine to create one larger amplitude wave. And after being in the same location and adding the amplitudes together, the two waves will continue on with the same shape and amplitude as before interfering with one another.

Constructive Interference: Waves are on the same side and increase the amplitude of the wave.



Destructive Interference: Waves are on opposite sides and decrease the amplitude of the wave.



- **Total Destructive Interference:** Waves completely cancel one another out and the net result is no wave. This requires the waves to be mirror images of one another.