

Standing Waves

Let's consider that electromagnetic waves travel a way for trapped between two mirrors. There are standing waves.

A jump rope is a good example of a standing wave.



The jump is made negative going down to form a disturbance and then goes away to the wave. Jump rope is like a standing wave.

The places of zero amplitude are called nodes. The places of greatest amplitude are called antinodes.



A standing wave

Standing waves are created by two waves traveling in opposite directions. The wave has the same amplitude at the same time. In reality, though, it's a wave going up and down, just like a jump rope.

In a standing wave, each antinode is one-half of a wavelength.

$$1 \text{ Antinode} = \frac{1}{2} \lambda$$

$$2 \text{ Antinodes} = \lambda$$

Two standing waves (the same wave) are shown. The first wave is a sine wave. The second wave is a cosine wave. The first wave is a sine wave. The second wave is a cosine wave.



Standing wave

A graph of the fundamental wave for a standing wave.

The longest wave that can be produced in a certain distance is called the fundamental. It is one-half of one wavelength long.

Standing Waves

Standing waves occur between objects whose distance is equal to the wavelength. Standing waves occur in the tube. Standing waves occur in the tube. Standing waves occur in the tube.

Part 1: Standing Waves in a Tube



Standing Waves in a Tube

Standing waves in a tube. Standing waves in a tube. Standing waves in a tube. Standing waves in a tube. Standing waves in a tube.

Part 2: Standing Waves in a Tube

Part 3: Standing Waves in a Tube

Harmonic	Wavelength	Frequency	Amplitude	Phase
1st	$\lambda = 2L$	$f = \frac{v}{\lambda}$	1	0
2nd	$\lambda = L$	$f = \frac{v}{\lambda}$	2	π
3rd	$\lambda = \frac{2L}{3}$	$f = \frac{v}{\lambda}$	3	2π
4th	$\lambda = \frac{L}{2}$	$f = \frac{v}{\lambda}$	4	3π
5th	$\lambda = \frac{2L}{5}$	$f = \frac{v}{\lambda}$	5	4π

Standing Waves Answers Stephen Murray

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