Standing Wave Kit

P6-7700

INSTRUCTIONAL GUIDE

Contents

- **10** Vibrator Units with string, battery holder and plastic disk
- **10** AA batteries

To activate the motor, insert the battery into the battery holder. To deactivate, remove the battery.

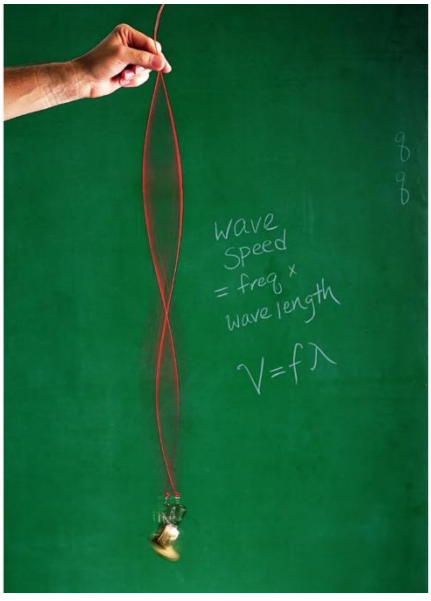
Background

When two longitudinal waves coming from different directions, cross and pass through each other their crests and trough can combine together increasing or decreasing the amplitude of the wave displacements. The observed overlapping appearance is called an interference pattern. For instance, when formed along a one-dimensional rope or spring, this can produce a pattern called a standing wave. Tie a rope to a wall and shake it and the wave reflected from the wall will come back and interfere with the following waves moving toward the wall. At the right frequencies a standing wave forms with parts standing still along the rope called nodes. Antinodes in contrast, form in regions of maximum displacement where the waves from opposite direction cross and add together constructively

Activities

Demonstrating Standing Waves:

1. Activate the vibrator unit.
2. Hang the vibrator from the string. Adjust the length of string until a standing wave is obtained. To change the number of anti-nodes in the standing wave pattern, simply vary the length of the string.



Determining Wave Speed - Method 1

1. Establish a standing wave on the string.
2. Measure the distance between adjacent nodes. Multiply this distance by two to obtain the wavelength of the disturbance.
3. Use a strobe light to measure the frequency of wave.
4. Calculate wave speed from $v = f \cdot \lambda$

Determining Wave Speed - Method 2

1. Use a balance to find the mass of the vibrator unit and the mass of a string sample.
2. Calculate the weight of the vibrator in Newtons. This equals the tension in the string (T).
3. Find the linear density of the string (μ= mass/length).
4. Calculate the wave speed from $v=\sqrt{(T/\mu)}$.

Related Products

Spring Wave (P7-7220) Use this highly visible Spring Wave to observe phase reversal at the fixed end of wave pulses and to test fundamental and multiple vibrations.

Resonance Bowl (P7-7510) See water dance to the vibrations from your hands with the Resonance Bowl! A fun and effective way to demonstrate the behavior of waves and their interactions.

Mechanical Wave Complete Bundle (P7-1100) The Arbor Scientific Mechanical Wave Complete Bundle makes harmonic and motion demonstrations affordable for ALL Physics classrooms.

Acknowledgement

Thank you, Chris Chiaverina, for help in developing this product.