

15800 WAVE DEMONSTRATOR

Purpose:

To demonstrate the properties of transverse and longitudinal pulses and waves.

Procedure:

Detailed methods for using these springs to demonstrate transverse waves, longitudinal waves, reflection, refraction, frequency, interference, and the behavior of single pulses traveling through different media are presented in the texts and laboratory guides of both the PSSC and Project Physics courses, as well as other places. For best results in investigating the basic concepts of wave phenomena, it is recommended that students consult these and other references. Professional literature offers other opportunities to use these kit components for wave demonstration purposes, for instance by suggesting that the Slinky[®] may be suspended every few turns by pieces of monofilament line attached to the classroom ceiling to enable both longitudinal and transverse waves to be easily demonstrated. Some teachers leave this mounted year round.

A starting set of demonstration ideas:

Stretch the Slinky[®] down a hallway with a student at each end. Ask each to send transverse and longitudinal pulses down the spring. Notice what they look like, and that they pass right through each other. Have the two students use the same frequency at the same time and build a marvelous, huge standing wave. Try doing this with a different frequency. Notice that only certain frequencies will “fit” the conditions of a certain spring stretched over a certain distance.

Stand two students on their desks or different lab bench tops, each holding one end of the SNAKEY. In turn, ask each to try to hold very still while the other sends a single violent pulse down the spring. Establish that energy goes from one end to the other, the metal wire simply goes up and down. The student at the other end cannot hold still.

Ask two students to quietly hold each end of the SNAKEY spring. The teacher places a simple folded and stapled paper “rider” near one end, then introduces a sharp transverse pulse at the other end. The students again observe that energy -- the ability to do work -- does the work of moving the rider through some distance. The pulses can demonstrate all five of the ways that the spring is elastic: extension, compression, bending, shear, and twisting. The rider and the class will do fine.

If the situation warrants, hook Slinky[®] to SNAKEY or either to a STRING. The behavior of a pulse or a train of waves as it goes from one wave medium to another is conceptually challenging, but it is definitely rewarding! Notice what happens to the orientation and amplitude of a pulse moving from one medium to another. What happens to the reflected portion? The transmitted or refracted portion? What if the new medium is more rigid than the first? If the new medium is less rigid than the first? What if there is a big difference between the two wave media? What can one learn from arranging for standing waves to form on both wave media at the same time? What would have to be constant to make this set of standing waves happen?

Related Product:

A Slinky[®] spring that is twice as long is available using # **15815, Super Slinky[®] and Stand**. For a given situation, it provides twice the viewing time and twice the stretched-out length. The included stand gives tangle-free storage as well as easier deployment and retrieval of the spring.

CAUTION:

As with all springs, these demonstration devices have an elastic limit. If the elastic limit is exceeded, the spring will not return to its original state. This is especially true of the “snakey” spring which is wound with a wire of circular cross-section. It is easily overextended if drawn beyond 150%.

Time Allocation:

To prepare this product for an experimental trial should take less than five minutes. Actual experiments will vary with needs of students and the method of instruction, but are easily concluded within one class period. Care should be exercised to prevent tangling during use and during storage so as to be ready for the next usage.

Feedback:

If you have a question, a comment, or a suggestion that would improve this product, you may call our toll free number.