

The Speed of a Wave

Two students are conducting a Slinky experiment. They are studying the possible effect of several variables upon the speed of a wave in a slinky.

Experiment 1

The students select a Slinky with 1-inch diameter zinc coils. They vibrate the slinky at certain frequencies to produce a standing wave pattern. The frequency of vibration and the wavelength of the waves are measured and used to calculate the speed. They perform two trials using two different vibration frequencies. Their data is shown in **Table 1**.

Table 1

Trial	Medium	Frequency	Wavelength	Speed
1	Zn, 1-in. dia. coils	2.2 Hz	1.6 m	3.5 m/s
2	Zn, 1-in. dia. coils	4.4 Hz	0.80 m	3.5 m/s

Experiment 2

In **Experiment 2**, the students use a Slinky with 1-inch diameter copper coils. They repeat the procedure in the same manner using a specific frequency to produce a standing wave. They measure wavelength and calculate the speed. They perform two trials with different vibration frequencies. Their data is shown in **Table 2**.

Table 2

Trial	Medium	Frequency	Wavelength	Speed
3	Cu, 1-in. dia. coils	2.1 Hz	1.20 m	2.5 m/s
4	Cu, 1-in. dia. coils	4.2 Hz	0.60 m	2.5 m/s

Experiment 3

In **Experiment 3**, the students use a Slinky with 3-inch diameter zinc coils. Once more, they determine the frequency that produces a standing wave. And they measure the wavelength and calculate the speed. Their data is shown in **Table 3**.

Table 3

Trial	Medium	Frequency	Wavelength	Speed
5	Zn, 3-in. dia. coils	2.2 Hz	1.82 m	4.0 m/s
6	Zn, 3-in. dia. coils	4.2 Hz	0.95 m	4.0 m/s