

31.4: Procedures

You will create different standing waves along the spring.

Warning

- Each person must pay attention and be ready in case the spring comes loose from the clamp.

- Use the clamp to securely fasten one end of the spring to a table.
- Stretch the spring out so that it does not touch the ground and is as close to horizontal as is possible, however, do not overstretch the spring! You do not have to use all of the spring, but you should have about 3 meters of horizontal spring. Any remaining length of spring may be coiled and held in your hand. Place a piece of tape on the spring where you intend to hold it, and place a piece of tape on the floor directly below your hold on the spring. Maintain this position for the entire experiment to ensure that the spring length is maintained.

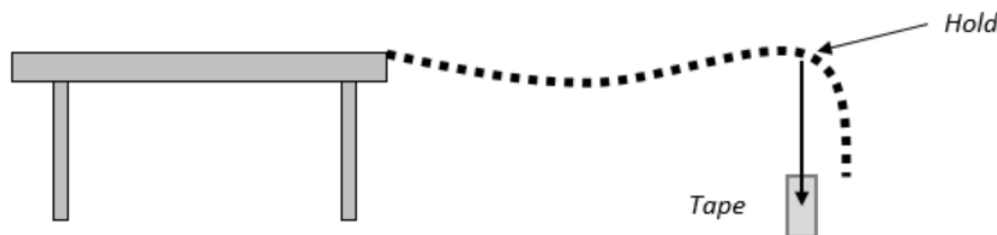


Figure 31.4.1

- Measure and record the length of the horizontal spring in meters, from the clamp to where you are holding the spring. This measurement will be used to determine the wavelength of the waves you produce.

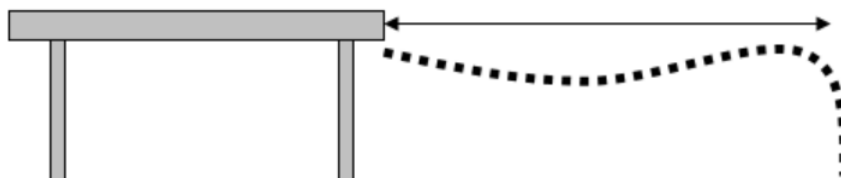


Figure 31.4.2

- Draw a table in which to record your data. **Do not fill in data until you have read the instructions for obtaining that data.**

Table 31.4.1: Wave Data & Analysis

	Time for 10 Cycles (seconds)	Period (seconds)	Frequency (Hertz)	Wavelength (meters)	Wave Speed (m/s)
1 bump					
1 high bump					
2 bumps					
2 high bumps					
3 bumps					

- Create a wave on the spring by continuously moving your hand up and down in a maintained rhythm that sustains one bump. Be careful to maintain your positioning such that your hand remains aligned with the tape on the floor. While the one bump standing wave is sustained, measure the time it takes for 10 complete cycles. One cycle requires that the spring return to the start position, for example, begins at top and returns to top. Record the total time for 10 complete cycles in your data table.



Figure 31.4.3

6. Create a wave on the spring by continuously moving your hand up and down in a maintained rhythm that sustains one "high" bump. Be careful to maintain your positioning such that your hand remains aligned with the tape on the floor. Measure and record the time for 10 complete cycles of this wave.

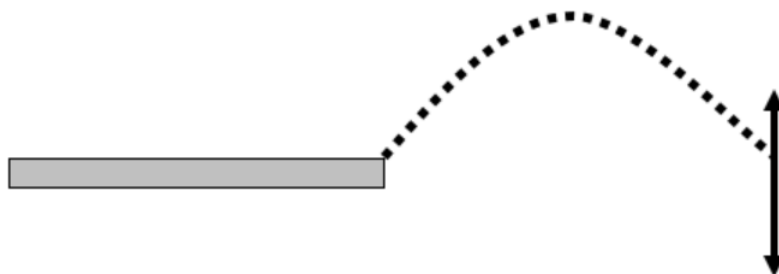


Figure 31.4.4

7. Repeat the one bump process for a two bump wave. Measure and record the time for 10 complete cycles of both the regular two bump wave and the "high" two bump wave.

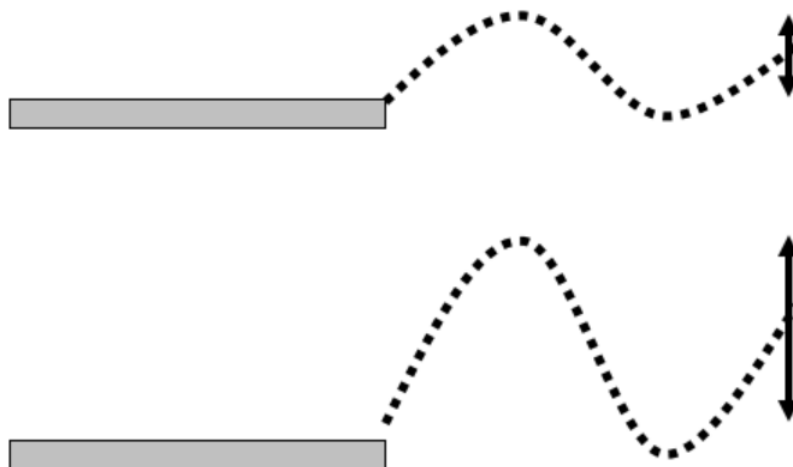


Figure 31.4.5

8. Repeat the one bump process for a three bump wave. Measure and record the time for 10 complete cycles of the regular three bump wave; you do not need to acquire data for a "high" three bump wave. The "high" three bump wave is very difficult to sustain.

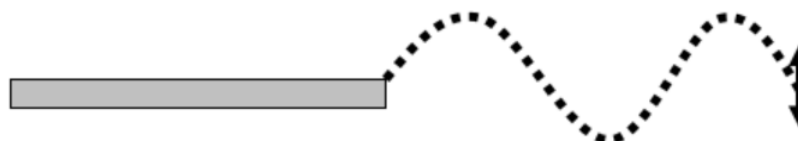


Figure 31.4.6

9. Investigate and determine the greatest number of bumps you can produce in this length of spring. Record your maximum number of bumps, counting both the up and the down bumps of the wave.
10. Calculate the period, frequency, and wavelength for each wave (except the wave with maximum number of bumps), and record these values in your data table.

Clean-up

- Remove tape from spring and floor, and throw tape away in the trash

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