

## Waves on a Spring

For a change of pace, work in groups of 3 - 5 people out in the hallway. You will need 2 people to hold either end of the spring 6 meters apart. One other person is needed to record the data and the others will be responsible for timing the various pulses or standing wave patterns.

If you are one of those holding either end of the spring and you get too tired, hand off to one of the individuals timing.

If you are the one responsible for setting up the standing wave patterns and others in your group are busy critiquing your style, feel free to have the individual with the loudest critiques take over for you.

If you accidentally release your end of the spring, your lab partner will be very irate with you, especially if s/he gets hit. And the lab instructor will find the situation humorous, especially if the struck lab partner tries to strike back. So please be careful at all times when holding the spring.

**Note:** At all times, keep the springs on the floor.

As always, read over the questions before the experiment to see what information you need to take note of as you do the experiment.

For Part I of the experiment...

- A small transverse pulse involves pulling the spring to the side 1.0 tile length.
- A medium transverse pulse involves pulling the spring to the side 1.5 tiles length.
- A large transverse pulse involves pulling the spring to the side 2.0 tiles length.
- Timing data should range from 0.8 s to 1.4 s.
- A secret the lab instructor is keeping from you is that the speeds for the 3 transverse waves should be the same.

For Part II of the experiment...

- Make sure the loops and nodes on your standing wave patterns are well defined.
- Since one cycle is the time it takes the person setting up the standing wave to move her or his hand from one side of the floor and back, it is easiest to time for 10 cycles by having the person generating the waves to set up a good rhythm and then tell the timer(s) when to start and stop the stopwatches.
- Pay attention to how much effort is needed to generate the various standing wave patterns.
- Another secret the lab instructor is keeping from you is that the speeds for the 4 trials of Part II should be the same.

For Part III of the experiment...

- Pay attention as to whether a large amplitude standing wave pattern requires more effort than a small amplitude standing wave pattern when the wavelength is held constant.

Extra credit = 1 point this week.

- For 0.5 points, recreate and fill in the data table from Part I using the small, medium and large transverse pulses using a distance of 8 meters between ends of the spring.
- For the 0.5 points, answer the 2 questions asked in the extra credit section.

Textbook References

- Note: These are meant as a rough guide only.
- Conceptual Physics - Ch. 7: 110-2, Ch. 19: 363-71
- Physics, A World View - Ch. 15: 295-304

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