Name:

Waves Velocity/Particle Velocity
Calc/Phys Spring 2000

In this exercise, we will examine a single wave pulse which travels down the slikny. Equipment needed: slinky, timer, yardstick

- Predictions *Before* you do any experiments, please answer the following questions. If there is disagreement in your group, that's fine! Just write down what opinions there are.

    1. Consider v_w which is the velocity of the wave pulse and v_p which is the velocity of a particle (or perhaps more concretely a ring) on the slinky. Are these in the same direction?

    2. Sketch below $x(t)$ for a single ring of the slinky as the wave goes by. Based on this sketch, is v_p a constant?

    3. Do you expect that v_w and v_p are of the same value? Explain.

    4. List a few things you can change about the system that you expect would make v_w larger. What do you expect would make v_p larger?

- Data Taking The next step is to obtain values for v_p and v_w.

  1. The first step is to write down parameters of your system so that you can reproduce the experiment.

     Length slinky is stretched:

     Amplitude of hand motion:

     Frequency of hand motion:

  2. Measure v_w by measuring distance traveled and time to travel. (To improve accuracy should you take a long or short distance?)

     distance:

     time:

     v_w

  3. Measure v_p in the same fashion.

     distance:

     time:

     v_p

- Further exploration Try several ways to change either v_p or v_w. Record your actions and the results below.

  1. Change in the system:

     v_w:

     v_p

  2. Change in the system:

     v_w:

     v_p

  3. Change in the system:

     v_w:

     v_p

- Conclusions Based on your experiments, are v_p and v_w always the same value? What does each velocity depend on?