Lab: Waves on a slinky.. *(this is wave interference we can see!)*

When a substance undergoes a phase change (from solid to liquid, for instance).. the energy which is flowing into the substance is used to break the bonds of the particles from each other..

In teams of 3.. (one to hold each end of the slinky and one to record the time with a stopwatch timer).

(note: you will work in teams of three to record data, but each person will fill out this worksheet individually and hand it in).

Record the distance (d) between the End Nodes here.. _____ (feet)

For each of the following 'modes' of vibration,

Draw the Standing wave Form below.

1st Mode of Vibration

Time for 10 complete cycles _____
Time for 1 cycle _____ Frequency _____(1/sec)

Relationship between (d) and (ʎ)

Wavelength of 1 complete wave _____
Use this space to calculate the velocity of the waves. (box your answer)

2nd Mode of Vibration

Time for 10 complete cycles _____
Time for 1 cycle _____ Frequency _____(1/sec)

Relationship between (d) and (ʎ)

Wavelength of 1 complete wave _____
Use this space to calculate the velocity of the waves. (box your answer)

3rd Mode of Vibration

Time for 10 complete cycles _____
Time for 1 cycle _____ Frequency _____(1/sec)

Relationship between (d) and (ʎ)

Wavelength of 1 complete wave _____
Use this space to calculate the velocity of the waves. (box your answer)

(Continued on back side)

Looking at the pattern in formulas for the relationship between wavelength and the 'mode' of oscillation, determine the 'general formula for wavelength for an infinite series of standing waves.. (i.e., what would the 5^{th} mode of oscillation look like? What would the wavelength be? What would the 9^{th} mode of oscillation look like? What would the wavelength be as a function of d)

Looking at the pattern in frequencies for each mode of oscillation, what would the general formula be for additional modes of vibration be? (note: the first frequency with the longest wavelength is called 'the fundamental frequency).

Looking at the speeds you calculated for each wave form, what can you conclude about the general 'rule' for wave speed (in a slinky as an example).

Use the space below to convert your average wave speed (feet/sec) to miles/hour.. (note: there are 1320 feet in $1/4^{th}$ of a mile). Show the conversion factors you are using and that the units cancel out.

(Note: first write down the equalities which will be converted into conversion factors!)

Now convert that value (now in Miles/hour) into meters per second. (using the fact that 1km = .62 miles).. once again showing your conversion factors along the way).

(Note: first write down the equalities which will be converted into conversion factors!)