## Standing Waves – Investigation

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Name:	Date:					
INTRODUCTION Standing waves are proc speed interfere with one investigation a slinky wil	another.	Standing way	es can be created	-	-	_
EQUIPMENT 1 stop watch, 1 slinky, 1	Newton N	Лeter, 2 pieces	s of tape.			
<u>PROCEDURE</u>						
<ol> <li>Mark out 5 meters of throughout the expense.</li> </ol>	the 5 met	•			ky. Keep	this tension
PART 1						
1. Send a single pulse or return.	down the s	slinky. Measu	re the time for the	e pulse	to go to c	one end and
Number of lengths of slinky	Dista	nce (m)	Time (s)		Speed (m/s)	
2						
2						
PART 2			Average S	peed:		
<ol> <li>Set up a standing wa in the data table.</li> </ol>	ave at eacl	h of the <i>harmo</i>	onic frequencies of	f the sli	nky. Reco	ord your data
Standing Wave type	# of nodes	# of antinodes	Wavelength, $\lambda$ (m)	Frequ (Hz)	iency, f	Velocity (m/s)
Fundamental Frequency $(1^{st} Harmonic), f_1$	2					
$2^{nd}$ Harmonic, $f_2$	3					
3 <sup>rd</sup> Harmonic, f <sub>3</sub>	4					
4 <sup>th</sup> Harmonic, f <sub>4</sub>	5					

Average :	Speed:		

**Finding the frequency:** Once you have set up the correct standing wave, you have to determine the wavelength and frequency for it. To determine the frequency, count the time for 10 cycles (10 back and forth movements of your hand) and divide 10 by the time that you find.

2. Neatly and accurately sketch each of the harmonics of the slinky: label the nodes, antinodes, wavelength and state the wavelength in metres.

## Harmonic



4th lacktriangle  $\lambda =$ 

## DISCUSSION:

- 1. As the wavelength for the different harmonics became smaller, what happened to the frequency?
- 2. Since the medium the waves were traveling in did not change, and the tension was kept constant, the velocities should have been the same. Did you get this result?
- 3. Theoretically, the harmonics are integer multiples of the fundamental frequency ( $1^{st}$  harmonic). That is,  $f_2 = 2f_1$ ,  $f_3 = 3f_1$ ,  $f_4 = 4f_1$ , and so on. Compare your experimental values with those calculated using the above relationships. Do the math and show your work!