MINILAB WORKSHEET: SPRING-LIKE FORCES (*see accompanying instructions*)

Everyone collects data. Staple or clip all worksheets together. Make sure that everyone has all the data and analyses.

Your name_____Lab section_____

Names of partners:_____

DATA FOR STRAIGHT WIRE

Wire material: _____ Length of wire: L_0 = _____ Radius of wire: _____

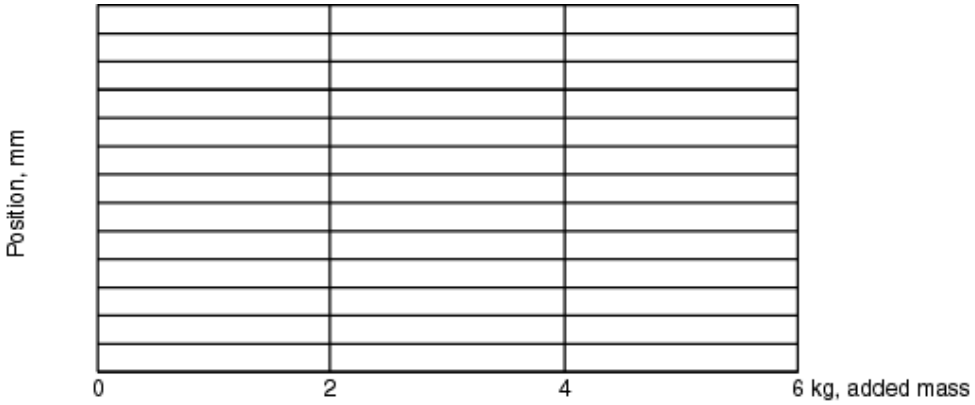
Parts 2.1-2-6 of the instructions

Added mass, kg	Position, mm Trial 1	Position, mm Trial 2	Position, mm Trial 3
0			
2			
4			
6			

Approx. variation is ±_____ mm

ANALYSIS OF DATA FOR STRAIGHT WIRE

Part 2.7: Graph your data; *see accompanying instructions* on how to include error bars, and how to draw a line through the data. Include scale on the vertical axis. ***Offset the y origin in order to use most of the graph.***



Part 2.8: Show calculation of stiffness k_s for the whole wire. Use SI units (kg, m, s).

Part 2.9: Show calculation of Young's modulus. Be sure to use SI units.

$$Y = \frac{(F/A)}{(\Delta L / L_0)} =$$

A COILED SPRING

You have a long coiled spring and two or more small masses that can be hung from the spring. You will determine the stiffness k_s of your spring, and the period (round-trip time) for oscillations of the spring-mass system. You will use these data later in a computer program you will write to model the motion of the system.

Masses of two fisherman's sinkers used with coiled spring: _____ _____

Parts 3.1-3.3 of the instructions: Hanging motionless at the "equilibrium position"

Added mass, kg	Length of spring L, m	Stretch $s = (L - L_0)$, m	k_s, N/m
0	$L_0 =$	$s_0 = 0$	
$m_1 =$ _____ kg	$L_1 =$	$s_1 =$	$k_s =$
$m_1 + m_2 =$ _____ kg	$L_2 =$	$s_2 =$	$k_s =$

The two values for k_s should be very similar. If they are not, repeat your measurements:

Added mass, kg	Length of spring L, m	Stretch $s = (L - L_0)$, m	k_s, N/m
0	$L_0 =$	$s_0 = 0$	
$m_1 =$ _____ kg	$L_1 =$	$s_1 =$	$k_s =$
$m_1 + m_2 =$ _____ kg	$L_2 =$	$s_2 =$	$k_s =$

Part 3.4 of the instructions: Oscillating up and down, *small amplitude* (you'll use a big amplitude in Part 3.6)

Amplitude	t for 10 cycles	Period $T = t/10$

Part 3.5 of the instructions: Repeat measurements of Part 3.4

Amplitude	t for 10 cycles	Period $T = t/10$

Part 3.6: Twice the amplitude of Part 3.4

Amplitude	t for 10 cycles, exp 1	t for 10 cycles, exp 2	Average t, 10 cycles	Period $T = t/10$

With twice the amplitude the mass has to move twice as far, so one might expect the period to increase. Did the period change significantly when you doubled the amplitude? _____

Part 3.7: Twice the mass, *small amplitude like Part 3*.4

Amplitude	t for 10 cycles, exp 1	t for 10 cycles, exp 2	Average t, 10 cycles	Period $T = t/10$

Is the period with twice the mass significantly different from the original period? _____

Ask an instructor to check your work.

See instructions at start of worksheet for turning in your work.