Name: _____ Date: _____

The Pendulum and Harmonic Motion

Objective: To determine the factors that influence the period of a pendulum. Investigated topics will include amplitude of the swing, mass of the bob, and the length of the pendulum arm.

Procedure:
Construct a pendulum with length of string about 40 cm and a fixed pendulum bob.

Part A: Investigating Amplitude
1. Record the mass of the bob and the length of the arm below.
2. Raise the mass to a small angle, less than twenty degrees is ideal, and release. Time how long it takes for ten complete swings to take place.
3. Change the amplitude to another small angle (approximately thirty degrees is good) and repeat.
4. Repeat once more at an angle of ten degrees.

Part B: Investigating Mass
1. Return to the original twenty degree angle for this part.
2. Use three different pendulum bobs and record the time it takes to complete ten full cycles.

Part C: Investigating Length
1. Return to the original mass and angle for this part.
2. Record the time needed for arm lengths that range from 10 to 65 cm, with 5 cm intervals used.

Data:
Part A:

Mass = _____ g Length = _____ cm

Trial	Angle	Time for 10 cycles (s)	Period (s/cycle)	Frequency (Hz or cycles/s)
1				
2				
3				

Part B:

Amplitude = _____ degrees Length = _____ cm

Trial	Mass (g)	Time for 10 cycles (s)	Period (s/cycle)	Frequency (Hz or cycles/s)
1				
2				
3				

Part C:

Trial	Length (cm)	Time for 10 cycles (s)	Period (s/cycle)	Frequency (Hz or cycles/s)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Results:

1. In a paragraph, describe which factors affect the period of the pendulum most, and which factors do not.
2. Use your data to graph the relationship between pendulum period and length from Part C.
3. Square the lengths of all the pendulum arms in part C.
4 Construct a second graph that shows the relationship between period and length^2. What is the relationship between period and length^2?