Virtual Laboratory

Topic 02 – Experimental Models

			02
Name	Section #	Date	Topic #

Links to Digital Data Sheets and simulators are available using the **Physical Science Portal** located at sciencescene.com or a link provided by your instructor.

Obtain the PHET Pendulum Simulator and notice the controls. Play with the program. Once you are comfortable using the simulator. use it and your text book to answer the following questions.

1. Does the period of the pendulum depend on Length? ____
   a) How do you know? _____
   b) What is the independent variable? _____
   c) What is the dependent variable? _____

2. Does the period of the pendulum depend on Amplitude? _____
   a) How do you know? _____
   b) What is the independent variable? _____
   c) What is the dependent variable? _____

3. Does the period of the pendulum depend on Mass? _____
   a) How do you know? _____
   b) What is the independent variable? _____
   c) What is the dependent variable? _____

4. What is the smallest division on the ruler? _____

5. What is the smallest division on the protractor? _____

6. How should the measurement rule be applied in each case? (How many decimal places will you need to have in your answer for each measuring instrument?) Provide an example measurement for each.
   a) Ruler: _____
   b) Protractor: _____

• 02 •

EXPERIMENTAL MODEL

	Report Name (ie. 019902)		
			02
			02
			02

Name Section # Kit # Topic #

Part A - Mass

Constant(s): Amplitude ___ degrees Length ____ cm

Independent variable ___ Dependent variable _____

Research Question: _____

Hypothesis: _____

If any of your measurements fall outside of what is expected redo the measurement(s).

Mass in grams	10	20	30	50
Time for 10 periods (s)				
Time for 1 period (s) graph				

Does your data support your hypothesis? Explain. Show any statistical analysis as required by your instructor.

Part B - Amplitude

Constant(s): Length ___ cm. Mass ___ grams

Independent variable Dependent variable

Research Question: _____

Hypothesis: _____

If any of your measurements fall outside of what is expected redo the measurement(s).

Amplitude (degree)	5	10	15	20
Time for 10 periods (s)				
Time for 1 period (s) graph				

Does your data support your hypothesis? Explain. Show any statistical analysis.

Part C - Length

Constant(s): Amplitude _____ degrees Mass _____ grams

Independent variable _____

Research Question _____

Hypothesis _____ Dependent variable _____

If any of your measurements fall outside of what is expected redo the measurement(s).

Length (cm)	10	20	40	60	80	100
Time for 10 periods (s)						
Time for 1 period $(s)_{graph}$						

Does your data support your hypothesis? Explain. Show any statistical analysis.

Part D – Graphing (Make 3 graphs. Dependent variable: y axis & independent variable: x axis.)

1 **Directly Proportional relationship**: Graph is a straight line that passes through the origin.
2 **Linear relationship**: Graph is a straight line that does not pass through the origin.
3 **Non-linear relationship**: The graph is not a straight line. but curves.

(1) What is the relationship between Mass and Period (**Part A**)? ___ (select 1. 2. or 3 from above)

(2) What does the dependent variable do as the independent variable increases? (Circle or highlight your selection between the bold choices below.) Does the dependent variable **increase** or **decrease** or **remain the same**?

(3) What is the relationship between Amplitude and Period? (**Part B**)? ___ (select 1. 2. or 3 from above)

(4) What does the dependent variable do as the independent variable increases? (Circle or highlight your selection between the bold choices below.) Does the dependent variable **increase** or **decrease** or **remain the same**?

(5) What is the relationship between Length and Period? (**Part C**)? ___ (select 1. 2. or 3 from above)

(6) What does the dependent variable do as the independent variable increases? (Circle or highlight your selection between the bold choices below.)
Does the dependent variable **increase** or **decrease** or **remain the same**?

(7) From the Period vs. Length graph determine what the period of the pendulum is for 50 cm. (Remember units!!!)

a.) L = 50 cm and P = _____

Test the graphical predictions by actually measuring the period for the 50 cm length. (Remember units!!!)

b.) L = 50 cm and P = _____

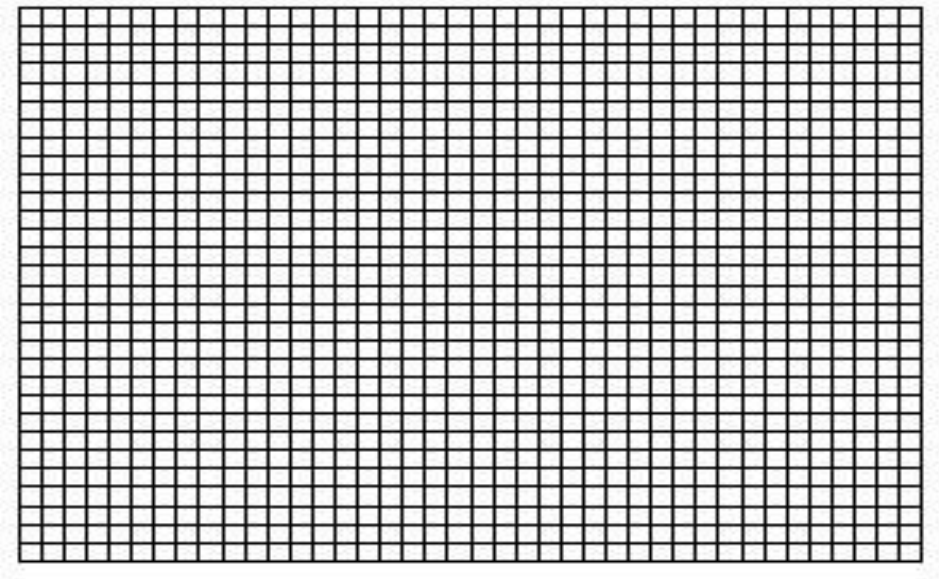
For L = 50 : Error = $|P_{(\text{from 7a.})} - P_{(\text{from 7b.})}|$ = _____

Calculate the percent error for L = 50 cm. (Show your work below.) _____.

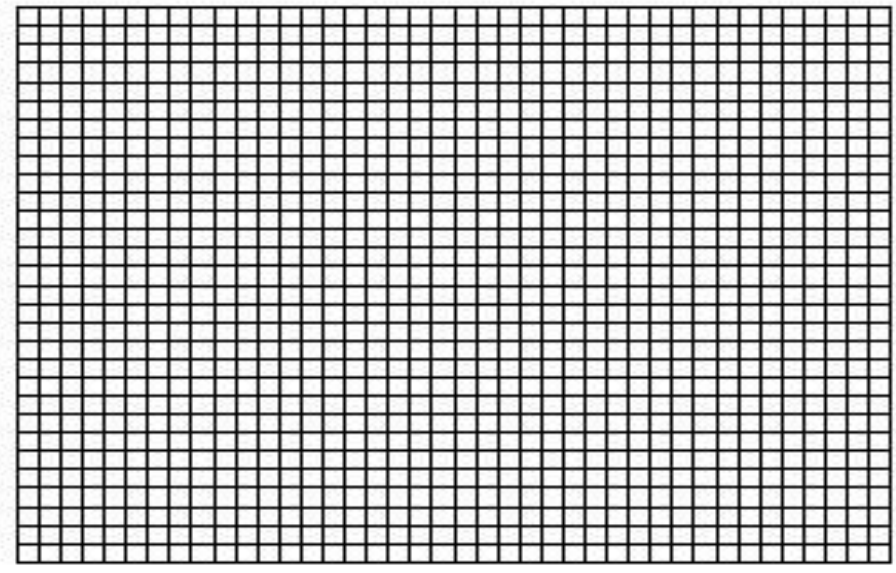
$$\%error = \frac{100.x.Error}{TheoreticalValue \text{ (prediction from graph)}}$$

If your instructor permits you to use a graphing program. you can omit the following graphs.

Part A



Part B



Part C

Title: **Period vs Length of the Pendulum**