Physics 11 Lab 1 – The period of a pendulum

"the power of science is the ability to predict results"

Name: _____ Date: _____

Partners: _____

Purpose: After we discuss the lab you will write your own purpose.

Predictions:

- Make a prediction of how changing the length will change the period.
- Make a prediction of how mass will change the period.

Materials: sketch how your materials are set up and label your drawing

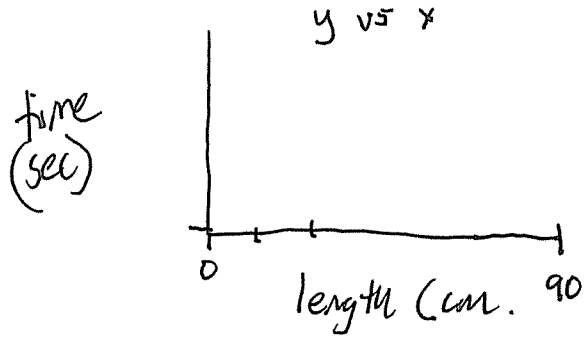
Procedure: ***don't copy out on your lab report***

1. You will measure the period of a pendulum (washer or bolt on a string) for various lengths, 10 cm to 90 cm every 10 cm. You will time 30 swings for each length. You can use the data table provided. Length should be measured to the center of mass of your washer/bolt.

2. Vary the mass of your pendulum, ie try 2M or 3M. Again time the pendulum for 30 swings. Briefly describe your procedure and record your data in a table of your own design.

Data Analysis

1. Using the provided graph paper make a graph with the length on the x axis and the period (time for 1 swing) on the y axis. Be sure to label each axis with a name and units and include a title. Draw a smooth curve through your points.



Conclusion *Answer incomplete sentences, include the question in your answer.*

Look for a pattern on your graph.

Part 1:

a) Tell we what happens to the period (time for one swing) of the pendulum as the pendulum gets longer.

b) If you double length, does the period double?

c) What happens to the period when length is increased by 4x?

d) How did you do on your prediction?

Part 2:

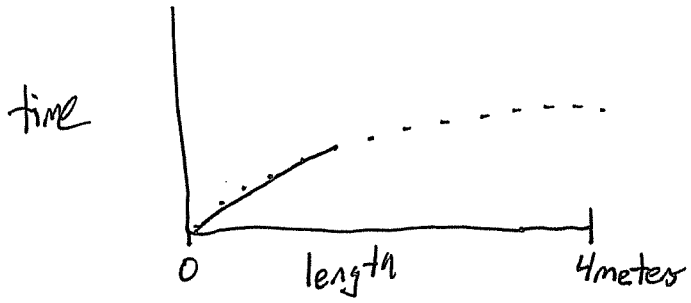
a) Tell me (convincingly) how mass affects period.

b) How did you do on your prediction?

Big Pendulum

We will go outside and collect data on a big pendulum. We will be trying to see if we can make an accurate prediction based on our earlier data.

a) I will help you construct a graph that will allow you to extrapolate.



b) When scientists make predictions outside their data range this is called **extrapolation**. Make a prediction of the period of a swing with length _____ .

c) Test your prediction by timing the swing with person on it for 30 swings.

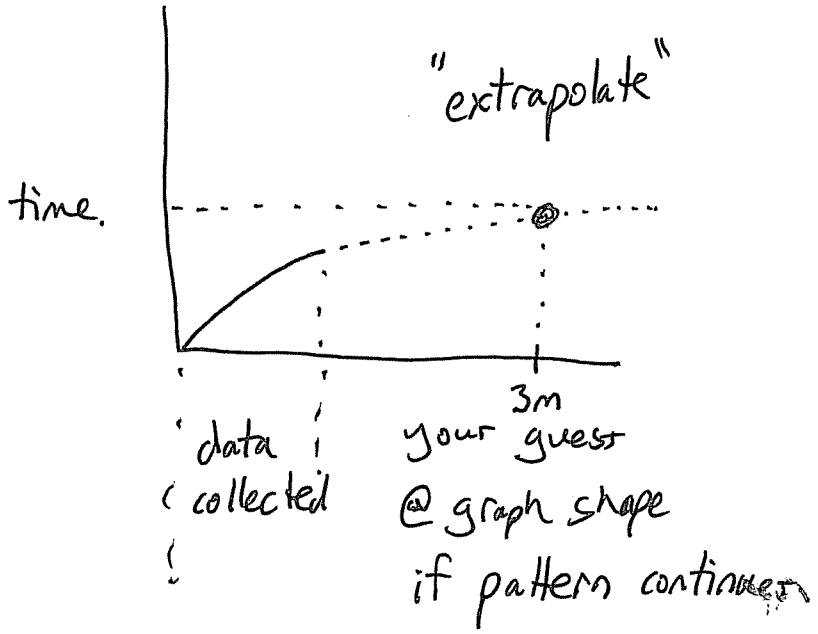
d) How good was your prediction? Calculate the percent difference between you predicted period and the actual period you measured.

Data Table for

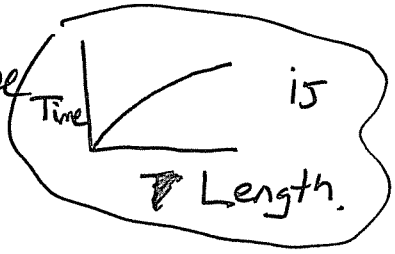
Length (cm)	Time for 30 swings (seconds)	Time for 1 swing = period (seconds)
10		
20		
30		
40		
50		
60		
70		
80		
90		

Making Predictions

① From graph.



② From equation. this graph shape



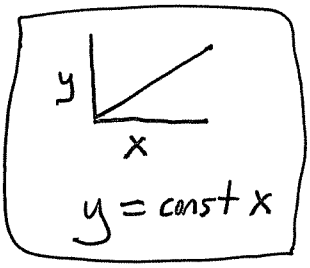
described by $T = \text{constant}\sqrt{L}$

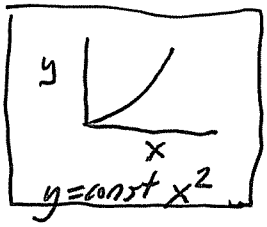
in english this means, if the length goes up 9x, the period T goes up $\sqrt{9x} = 3x$.

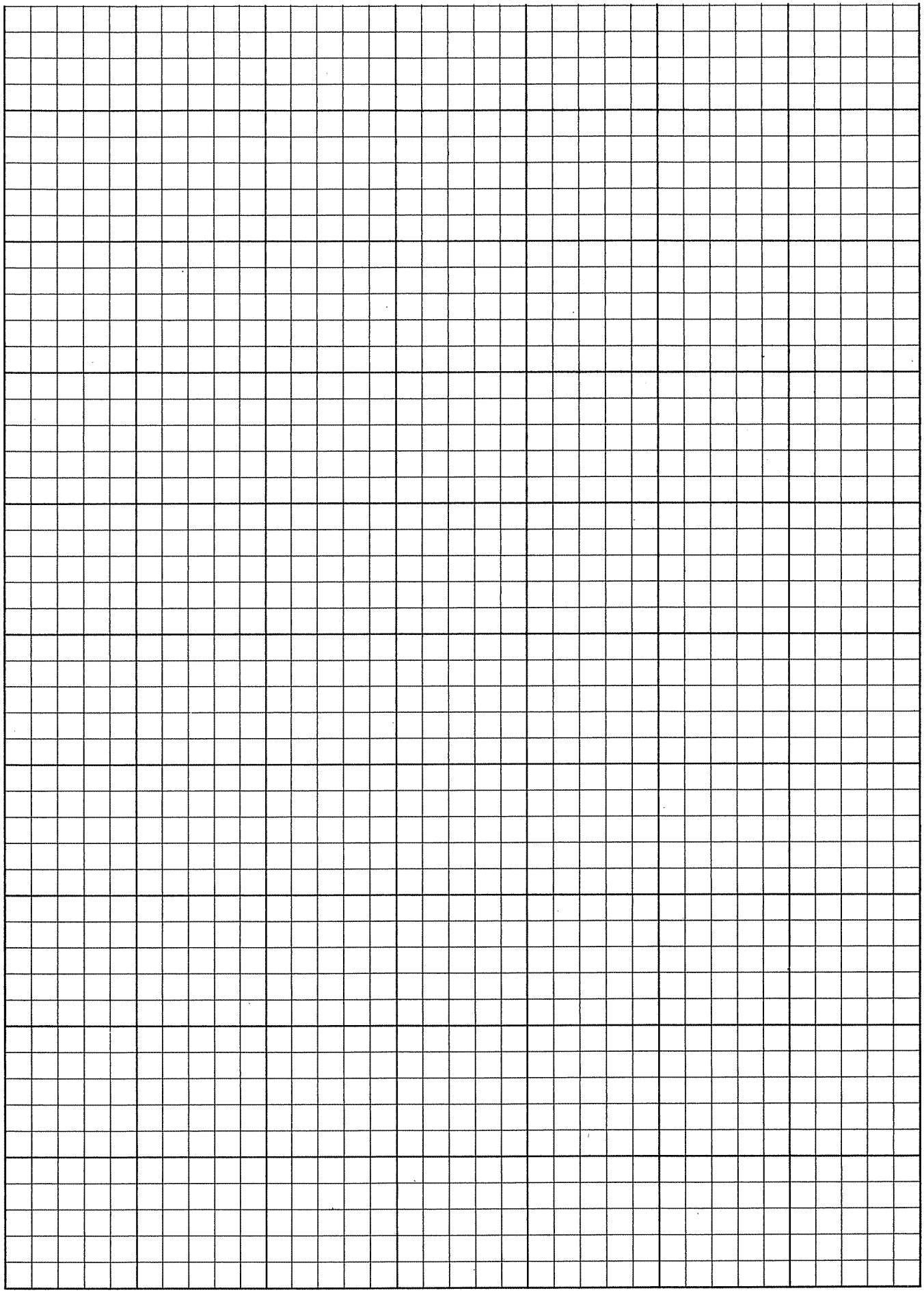
example. T for 10cm = _____

$\downarrow 30x$ $\quad \times\sqrt{30}\downarrow$

T for 300cm = _____







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Period vs. Length for a Pendulum