

PHYSICS LAB - FRICTION PART II

Confirming the Formula $F_f = \mu F_N$ and Finding a Coefficient (*Dynamic/Kinetic*) of Friction

NAME _____

SEC _____

DATE _____

I. INTRODUCTION - A formula has been proposed to describe the relation between the friction force and the normal force. Your job is to **verify** this formula by taking different measurements of each force and plotting them to see if they form a line. Then you will calculate the coefficient of friction. Include all answers to questions posed herein in your lab report.

1. What is the equation for the force of friction ?
2. What does each letter stand for?

For a weight sled on a table, F_N is the same as W (*weight force*), so you will **weigh** things.

II. MATERIALS

Force meter

A number of weights

String

Weight Sled

III. PROCEDURE AND DATA

1. Set up a table with two columns. The first is for Normal Force, the second is for Friction Force. Indicate the correct units at the top of each column.
2. "Weigh" the empty weight sled with the meter. Record this reading in your table under "Normal Force."
3. Lay the weight sled on the table and drag it with the force meter **slowly and at constant velocity** across the table. Record this reading under "Friction Force" in your table.
4. Weigh any given weight. Assume all weights are comparable (*i.e. the same*).
4. Repeat, but first put the three "weights" on top of the weight sled. For the **Weight**, you must add the weight of the three weights to the weight of the weight sled.
5. Repeat with various masses on the weight sled. (*For example, 6 weight blocks, 9 weight blocks and 12 weight blocks*) This will give you five (5) data points in your table.

IV. ANALYSIS (*Plot Friction Force versus Normal Force*)

1. Use most of the graph paper.
2. Title the graph.
3. Put a label and units on each axis.
4. Plot points.
5. Draw a best fit line.
6. Read the slope of the line.
7. Show all work on the graph.
8. What is the slope ? Extend your best fit line, with a ruler, to the y-axis.
9. What is the value of your y-intercept? _____ (*Be sure to get the units right.*)
10. How good a model is the equation for friction? a) *very well* b) *a fair fit* c) *not well*
11. Now use your result to make a **prediction**. How much force would it take to slide a weight sled that weighs 800 N across your table? (*Use your value for μ above.*)