Name _____ Class Period _____

Lab - AP Physics 1 – The Mu of Your Shoe

Part 1

Exploration and observations

Using a shoe, a spring scale and a weight, determine what factors affect the amount of force necessary to pull the shoe across a given surface. Write down your observations in your lab notebook. (Hint! You have really already done this, except you didn't use a shoe...when?)

Part 2

Research:

What is a "coefficient of friction"? Give some common examples, and comment on what is "high" and what is "low". How is the coefficient of friction calculated? (Hint: This should already be in your notes)

Part 3

Friction of a Shoe Lab

The objective of this lab is to determine the static and kinetic coefficients of friction of a shoe on the table.

Materials: Protractor, spring scales with various measuring scales, one or more shoes, lab table, various weights.

General Instructions:

1. Measure the weight of the shoe with a spring scale.

2. Place the shoe on the table and attach a spring scale to it. Use the protractor to measure the angle that the spring scale makes with the table.

3. Pull on the spring scale until the shoe begins to move. The force where it begins to move is the maximum applied force.

4. Use Newton's second law and the friction equation to solve for the coefficient of static friction.

5. For the coefficient of kinetic friction experiment, pull the shoe at a constant velocity. This will make the problem an equilibrium problem, which will simplify the calculations.

6. The force measured by the spring scale is the applied force, and this will be used in the calculations for the coefficient of kinetic friction.

In your notebook:

1. Title, Date, Lab Partner

2. Purpose/Question

3. Equipment list

4. Procedure

5. Diagram of lab setup with variables marked

6. Free-body diagram of shoe for any setup you choose to use

7. List of variables measured and calculated, with their values for **each trial** (one trial is never enough!). This should be in the form of a neat data table

8. Sample calculations, with explanations and commentary

9. Sources of error and ways to minimize the sources of error

10. Conclusion: Comparison of the static coefficient of friction and the kinetic coefficient of friction, in Claim-Evidence-Reasoning format