**11 Physics Group Lab: Determining the Coefficient of Kinetic Friction Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Group Members’ Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Lab Overview: Your goal is to determine the coefficient of kinetic friction (μk) between a variety of surfaces and the table.**

**Materials and Procedure:** Four sided friction block (wood/sandpaper/leather/cardboard), Newton spring scale (5.0 Newton range or 10.0 N range), mass set

**table**

**Friction block**

**Variable Masses**

**Fapp**

**spring scale**

**Introduction**

**Set up the apparatus as shown above. You will need to work out a procedure and analysis steps to determine the coefficient of kinetic friction between the table and each block surface.**

How should you move the block if you wish to determine the ***coefficient of kinetic friction***?

What will the FBD look like for this situation? Draw it and include it in your lab introduction.

You will need to determine the weight (Fg) of the block/mass system. You may use the spring scale to find weight. How can you then determine FN?

You will need to determine the force of kinetic friction, Fk. How will Fk compare to the applied force, Fapp if you pull the block at a constant velocity?

**Your group is responsible for measuring the μk between the table surface and TWO of the sides. Pick the sides you wish to analyze: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Hypothesis**

Make a prediction or hypothesis comparing the expected values of the coefficient of kinetic friction for each surface.

**Observation:**  Create a table to record the following parameters:

**Total Mass, Weight (Fg) , Normal Force (FN) Applied Force (Fapp), Kinetic Friction (Fk)**

Make sure to record the units, estimated uncertainties and appropriate precision for all measurements.

**Analysis points to consider:**

The equation relating force of kinetic friction and force normal is Fk= μkFN. How would you rearrange this equation to solve for μk?

In order to determine μk for each surface combination, you need to make several measurements for a variety of added mass values. Try to use at least 5 different masses for 5 independent trials for each surface. Use a **graphical method** to average the results for your trials. If you plot a graph of Fk versus FN what parameter will be given by the slope of the graph?

**Discussion Questions:**

1.a) Summarize your results for the coefficient of kinetic friction for the two surfaces you investigated.

Compare your results to your initial hypothesis. Was your hypothesis correct?

b) Compare your results to other tabulated values in your textbook (pg 148-Pearson or pg 170-

Nelson). Are your values reasonable compared to known values for other surface combinations?

2. Discuss how the coefficient of static friction would compare to the coefficient of kinetic friction for

one of your surfaces. Would the static coefficient be higher or lower than the kinetic coefficient?

Support your answer with qualitative evidence from your lab activity.

**Final Conclusion**: Summarize your results and discuss ONE source of error and how it could be

minimized.

**Rubric: Inquiry: \_\_\_\_\_/ 30 marks**

**Introduction:**  0 1 2 3 4 5

(Labeled FBD and explanation of how coefficient of kinetic friction can be found)

**Hypothesis:** 0 1 2

(Prediction for how coefficient of kinetic friction will compare for the two surfaces with reasoning provided)

**Observation Table:**  0 1 2 3 4

Table with the following parameters recorded:

Total Mass, Weight (Fg) , Normal Force (FN) Applied Force (Fapp), Kinetic Friction (Fk)

Appropriate Units and Precision Recorded

**Analysis:**

Graph of Fk versus FN for each surface 0 1 2 3 4 5

Determination of μk for each surface 0 1 2 3 4

**Discussion Questions**: 0 1 2 3 4 5 6

**Conclusion:** 0 1 2 3 4