Physics Name: _____

LAB #8: COEFFICIENT OF FRICTION Date: _____

Coefficient of Friction Lab #8

Pre-Lab Discussion: There are two coefficients of friction. The coefficient of kinetic friction (μ_K) multiplied by the normal force determines the friction force exerted by a surface that opposes the motion of an object sliding on it. The coefficient of static friction (μ_S) multiplied by the normal force determines the maximum friction force a surface can exert on a stationary object to prevent it from moving.

Purpose: To measure both static and kinetic coefficients for a brass mass on a ramp.

Materials: brass mass ramp metric ruler

Method:

STATIC FRICTION:

1. Make a free-body diagram of a mass on a ramp. Clearly show an appropriate coordinate system and all the forces or their components acting on the mass.
2. Because the system in your drawing is in equilibrium, F_N is equal to $F_{g\perp}$, and the F_f is equal to $F_{g\|}$.
3. Record the mass of your object.
4. Increase the incline angle of your ramp to determine the largest angle that does not allow the object to slip. Run five trials and record the rise and run of the ramp (in cm, on a spreadsheet).
5. Record both the formula used to calculate $F_{g\perp}$ kinetic and the value of $F_{g\perp}$ kinetic below.

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6. Record both the formula used to calculate $F_{g\|}$ static and the value of $F_{g\|}$ static below.

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7. Show an example calculation using the first trial in the space below, and your responses to 5 and 6 above to determine the coefficient of static friction. Use a spreadsheet to calculate all five trials and the average value for μ.

KINETIC FRICTION:

1. Adjust the ramp so that, after given a gentle push, the object slides at a constant velocity. Run five trials and record record the rise and run of the ramp (in cm, on a spreadsheet).
2. At constant velocity, how does F_f compare to $F_{g\|}$?

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3. In the space below, calculate $F_{g\perp}$, $F_{g\|}$ for the first trial, then calculate the coefficient of kinetic friction. Use a spreadsheet to calculate all five trials and the average value for μ.

SPREADSHEET: use a spreadsheet to calculate the values of μ for static and kinetic all five trials, then calculate the average values for both constants