

Name: _____

Date: _____

Dr. Croom's Physics

Static Equilibrium Lab 05-6

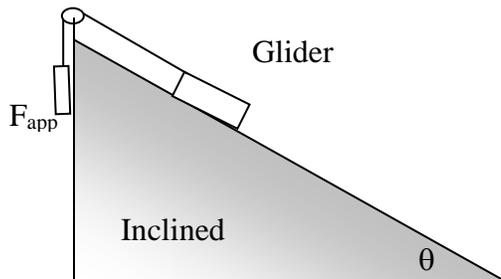
Static Equilibrium Incline [NOTEBOOK LAB]

Objective: Using the techniques discussed in class, the student will analyze 2 systems in static equilibrium and in doing so experimentally proving Newton's Second Law.

Apparatus: incline plane, support rods, carts, mass hangers, slotted masses
(spring scales could be used in place of slotted masses)

Background Information:

In any statics problem, we know that the sum of all forces is zero. In equation form, $\sum F = 0$. This includes all spatial directions as well ($\sum F_x = 0$ and $\sum F_y = 0$). In this experiment, two different systems in static equilibrium will be analyzed.



System: Mass on a Frictionless Inclined Plane.

In this first system, a lab cart will be placed in equilibrium on an inclined plane. The amount of tension needed for equilibrium will be experimentally measured from a spring scale. The tension will then be computed from a free-body diagram of the first system. These values will then be compared via a percent of error approach.

n	M_{Glider} (kg)	<u>extra mass on Glider</u> (kg)	<u>TOTAL Glider Mass</u> (kg)	θ ($^{\circ}$)	F_{applied} Weight hanging mass (N)	Calculated F_{parallel} (N)	% error
1		0.000		$\approx 15 \rightarrow$			
2		0.050		$\approx 15 \rightarrow$			
3		0.100		$\approx 15 \rightarrow$			
4		0.150		$\approx 15 \rightarrow$			
5		0.100		5			
6		0.100		10			
7		0.100		15			
8		0.100		20			

Calculation 1: a) Draw a free body diagram of system 1 in the space provided below.
b) Using the techniques discussed in class, derive an algebraic expression to calculate the tension force T as a function of m , θ , and g . This tension force is needed to hold the mass in system 1 in static equilibrium.

Calculation 2: Using the expression you derived in Calculation 1, complete Table 1.

System 2: Mass Suspended by two strings, angles unequal.

Questions/Things you need to do individually:

Purpose (5pt)

Include

Data (10pt)

Print and attach the data tables into your notebook.

Calculations (10pt)

Show an example of how to calculate the tension and error

Results (5pt)

Explain the result. Make sure you include how they relate to the purpose of this lab.

Conclusions (5pt)

A normal conclusion.