Name: _____

LAB 4. STATIC FORCES

Introduction

This lab involves combining three forces to give a zero net force.

Supplies

Force table, three pulleys, central ring with three leads, mass hanging hooks, protractor, disk masses, graph paper

Activity

The force table is a circle with three pulleys around the edge to support three threads tied to a central ring. Weights are hung from the threads and positioned on the circle so that the forces all cancel, centering the ring at the center of the table.

1. Obtain the angles and masses for two of your weights from the instructor.

   Mass 1: _____ Angle 1: _____ Mass 2: _____ Angle 2: _____

2. Center the ring on the retractable bollard at the center of the force table. Position two of the pulleys as directed and hang the directed masses, including the masses of the hooks, from their threads.

3. Determine the mass and angle that produces the **equilibrant** vector that combines with the other two tensions to yield a zero net force on the ring. You may determine this any way you like: graphically, by calculation (recommended), or by trial and error (not recommended). You may even show your work below. Write the equilibrant here.

   Equilibrant: Mass: _____ Angle: _____

4. Once you have determined the correct equilibrant, summon your instructor to witness that the two given vectors are correct and the equilibrant properly equilibrates. (If it doesn't, you get one more try.)

Report

Your report should not be long, but you must demonstrate that you understand how the vectors add together to produce a net force of zero on the central ring. You will do this in two ways.

Cartesian components

Express the three vectors as Cartesian components, add them, and see that their sum is close to the zero vector. Show your work.

Graph paper

Using graph paper, a ruler, and a protractor, represent the force vectors as scaled arrows and add the arrows together graphically. I find that a scale of 1.0 cm = 10 g works nicely. See that the sum is close to the zero vector.