AP Physics Part 1 Lab Handout 12 "Force Table"

Your Name:_____ Lab Partner(s):_____

Purpose: To determine if vectors that are added experimentally result in equilibrants that are trigonometrically correct?

Materials:
- 120 cm of thread
- 3 mass hangers
- mass set
- force table
- 3 super pulleys

Procedure:
1. Screw the three legs into the force table. Screw the center post into the force table until the top is flush with the top of the force table.
2. Cut two 60 cm pieces of thread. Lay the two pieces together and tie one overhand knot in the middle of the two pieces to form an "X".
3. Thread one of the pieces through the center post and tie this piece to one of the legs of the force table.
4. Tie two overhand knots on the end of each of the other three ends of the thread. Lay these over the pulleys and attach a mass hanger.
5. Place the pulleys at 0°, 120° and 240°. When you get the mass hangers to stop wiggling around, the knot should be right over the middle of the center post.
6. Adjust the height of each pulley so the thread coming from the top of the pulley is parallel with the top of the force table. The lower down the thread is, the less parallax in reading angle.
7. Place the assigned amount of mass on hangers one and two. Remember that the mass hangers have a mass of 0.005 kg. For all situations in this lab use 9.80 m/s^2 as the acceleration due to gravity.
8. Adjust these hangers to the assigned angle.
9. Experimentally determine the angle and magnitude of the equilibrant and record in your data table.
10. Repeat the experiment for the other four assigned vector pairs.

Observations:

Data:
Experimental Method:

Force Vector 1		Force Vector 2		Equilibrant	
0.539 N	0°	1.029 N	120°		
1.519 N	30°	1.029 N	180°		
0.784 N	270°	1.029 N	210°		
1.029 N	290°	0.735 N	180°		
0.441 N	70°	0.539 N	170°		

Data Analysis:
Trigonometric Method:
Use trigonometry to add assigned force vectors one and two and determine the direction and magnitude of the resultant. Remember to determine the components of each vector in the x and y directions and that all angles are rotated counterclockwise from 0°. The equilibrant is in the opposite direction of the resultant but has the same magnitude. Determine your percent error for the magnitude and direction. Attach all sheets showing your work.

Equlibrant		magnitude %error	direction %error

Diagram:

Error Analysis:

Conclusion: