GENERAL PHYSICS LABORATORY EXPERIMENTS WEEK 8

For the week 8 lab assignment, please answer the assignment questions found within the experiments. Your answers to questions and any results requested should be attached to this page and are due at the start of your next lab. You may hand write or type your responses to the questions posed in the assignment section, but we reserve the right to ask you to type your solutions in the future, if the quality of the written work is poor. **Please Note:** This experiment is the basis of the official writing assignment ("W") for this course, and you will be expanding upon one of these experiments for that assignment. Please see the "W" assignment sheet for more information.

Name: _____ Date: _____

Partners: _____ , _____ , _____

A. CONCEPT QUESTIONS

Assignment:

Explore concepts found in chapters 8 and 9 by completing as many questions as time permits, starting with question 1. You are responsible for completing all questions, unless indicated otherwise by your instructor.

B. ATWOOD'S MACHINE

Objective and Experiment:

Determine "g" for Atwood's Machine. Draw a force-diagram of the situation shown, including a defined direction of motion and acceleration. Using net-force on the system, determine an equation for acceleration of the system in terms of the masses and "g", then solve this equation for "g". For the masses given, measure the time it takes the masses to travel the largest distance possible for the given time. Calculate the average time for three trials for the measured distance, and calculate the acceleration of the system using a kinematic equation. Using the equation for "g" and your measured values calculate the value of the acceleration due to gravity and compare it via percent error with the accepted value.

Equipment: Atwood machine; Meter stick; Timer; Masses

Assignment:

Explain the steps you took to find the acceleration of the system. This includes discussing the force diagram, net force and mathematical steps necessary to find the acceleration equation. This can either be included in your calculations, or in a separate paragraph(s). If you do not include words in your calculations, at minimum identify your measured time, distance and acceleration due to gravity and your comparison with the accepted value. Discuss how your results compare with the accepted value and at least two potential sources of error.

	Exp A	Exp B	Exp C	Exp D
Grade				

Total Grade:	Graded By:

C. ROLLER ON A RECORD PLAYER

Objective and Experiment:

Explore the concepts of tension and centripetal acceleration. Draw a force-diagram of the situation, and via the net force on each object determine the relationships among, centripetal acceleration, tension, mass of the hanger and the mass of the roller. From your equations, derive a relationship for the mass of the hanger in terms of the mass of the roller, the desired radius, the angular velocity and other known quantities. Find the angular velocity of the system, by measuring ten revolutions and then calculating the period (be sure to start counting at ZERO). Using your derived equation and known/measured values, calculate the hanger mass necessary to keep the roller at the desired radius. Place the calculated mass on the hanger, and see if your answer is correct experimentally.

Equipment:

Turntable, Roller mass, Masses, Stop-Watch

Assignment:

Explain the steps you took to find your expression for the hanger mass. This includes discussing the force diagram, net force and mathematical steps necessary to find the hanger mass. This can either be included in your calculations, or in a separate paragraph(s). Also discuss how you found your angular velocity. Discuss how your results compare with the accepted value and at least two potential sources of error. Explain whether or not the system is in equilibrium.

D. WORK ON A CART

Objective and Experiment: **The rider must be willing to share their current mass.**

Explore the concepts of work, energy and friction, while pulling a group member on a cart for a known distance. Begin by determining the rider's mass by converting the scale reading of their mass to kilograms. Add this to the mass of the cart and spring scale to find the system's total mass. Beginning at the start location, the rider will hold the spring scale and another person will try to pull at a constant force of 20 N over a 3.0 m distance. At the end of the 3.0 m distance, the cart + rider will be allowed to coast for a distance of 1.0 m. Another group member will be responsible for measuring the time of the coast. Repeat 3 times, and average your time. From this data, calculate the work done on the cart + rider by the person pulling, and the kinetic energy of the cart+ rider after the pull ceases. Using the work-kinetic energy theorem, determine the total work applied to the cart+rider, and determine the cause and a value for the work being done on the cart + rider in addition to the pull.

Equipment: Kinesthetic cart, 0-20N spring scale, hallway, stopwatch.

Assignment: *cart+ rider = system*

Explain the steps of your calculations, either separately or within your calculations, including how you determined the work done by the pull, the kinetic energy of the system after the pull, the total work in the system, and the work being done on the system besides the pull. Explicitly explain the main source of the additional work being done on the system and the physical reason it has a negative sign associated with it. Finally explain two sources of error in the experiment and whether they were significant to your results.