PHYSICS 2A - LAB FINAL REVIEW

In addition to the lab summary below, the lab final will also include a practical component. By now you should also know how to write a coherent, comprehensive scientific lab report in the proper format.

Error Analysis

1. Understand and define random and systematic errors.
2. Make measurements and calculations to the correct number of significant figures.
3. Calculate the uncertainties in measurements using analog and digital measuring devices.
4. Understand error propagation.
5. Know how to apply the error propagation equations to calculate uncertainties.
6. Know how to use every measuring device used in any lab and how to calculate its uncertainty.
7. Know how to calculate % error.

LAB 1- Measurements and Error Analysis

1. What was the objective of this lab?
2. What was the theory associated with this lab?
3. Know how to use the measuring devices; digital balance, triple-beam balance, metric ruler, Vernier calipers.
4. What are the uncertainties of the measuring devices?
5. Know how to calculate area, volume and density.
6. Calculate the uncertainty of area, volume and density using the error propagation equations.
7. Identify the systematic and random errors involved and how they affected the results.

LAB 2 – Adding Vector

1. What are vectors? What are scalars?
2. What are the steps of adding vectors using component method? Using the graphical method?
3. What was the objective of the lab?
4. What was the theory associated with this lab?
5. How did you calculate the expected and experimental value for this experiment?
6. What was the force table used for?
7. Which method did we take as the expected value?
8. What type of error did friction in the pulleys introduce? How did it affect your results?
9. Identify the systematic and random errors involved and how they affected the results.

LAB 3 – Projectile Motion

1. What is a projectile?
2. What are the kinematic equations of motion?
3. How did you derive the equation for the range of the projectile in this experiment?
4. What was the objective of this lab?
5. What was the theory for this lab?
6. How did you calculate the expected and experimental value for this experiment?

7. How do you use EXCEL to obtain the equation of best curve-fit?
8. If the end of ramp was NOT horizontal, what type of error did it introduce and what was the effect on the result of the experiment?
9. Was air resistance a significant error in this lab? Why or why not? What type of error is it?
10. What was a systematic/random error in calculating the expected value of the initial velocity?
11. How many significant figures were possible for the expected value of V_o? Why?
12. Identify other systematic and random errors involved and how they affected the results.

LAB 4 – Atwood's Machine

1. What is the Atwood's Machine?
2. What was the objective of this lab?
3. What was the theory associated with this lab?
4. How did you calculate the expected and experimental value of the acceleration?
5. What assumptions were made in deriving the expected acceleration?
6. If the string was vibrating after the mass was released from rest, how did it affect the outcome of experiment? Was this a random or systematic error?
7. Identify other systematic and random errors involved and how they affected the results.

LAB 5 – Centripetal Acceleration

1. What was the objective of this lab?
2. What was the theory associated with this lab?
3. How did you calculate the expected and experimental value of the acceleration?
4. What is UCM?
5. What are the two equations for radial acceleration?
6. For how many different radii did you calculate the net force?
7. Was friction in the pulley, in the equilibrium part, a random or systematic error? Why? How did it affect the outcome of the experiment?
8. Was friction in the rotating axle a random or systematic error?
9. Not rotating the mass at a constant speed a random or systematic error?
10. What role did the spring force play in this experiment?
11. Identify other systematic and random errors involved and how they affected the results.

LAB 6 – The Simple Pendulum

1. What was the objective of this lab?
2. What was the theory associated with this lab?
3. How did you calculate the expected and experimental value of the acceleration of gravity?
4. What is simple harmonic motion?
5. What is the period of oscillation?
6. What is amplitude of oscillation?
7. What does angular frequency measure?
8. How did you determine if a simple pendulum can be used as a clock?
9. How did we physically justify the solution to the simple harmonic motion equation?
10. What assumptions did we make in deriving the simple harmonic motion equation?
11. Describe the procedure for collecting data for the period of oscillation.

12. If the ball “wobbled” along its motion, what type of error did it introduce? How would it affect the experimental result?
13. Identify other systematic and random errors involved and how they affected the results.

LAB 7 – Static Equilibrium

1. What at the conditions for static equilibrium?
2. What was the objective of this lab?
3. What was the theory associated with this lab?
4. What is torque conceptually?
5. What line of action of a force?
6. What is lever arm?
7. What are the 3 methods of computing torque?
8. What was the system for this experiment?
9. Identify systematic and random errors involved and how they affected the results.

LAB 8 – Conservation of Linear Momentum

1. What are two reasons momentum important?
2. What was the objective of this lab?
3. What was the theory associated with this lab?
4. When is momentum conserved?
5. What is an isolated system?
6. What is an elastic and inelastic collision?
7. Is kinetic energy a vector?
8. Can you sketch the collision the you observed?
9. Why was the spark generator used? What was the frequency used?
10. What was the system for this experiment?
11. How were you able to conclude if momentum and kinetic energy was conserved?
12. Identify systematic and random errors involved and how they affected the results.