**Circular Motion – Centripetal Force Design Lab**

**Purpose**: to explore the relationship between *r* and *T* using the forces of circular motion.

**Pre-Lab Questions:**

1. What is the formula for the acceleration of an object undergoing uniform circular motion?
   1. In terms of *v* and *r*:
   2. In terms of *r* and *T*:
2. Use Newton’s Second Law to make a formula for the centripetal force acting on an object in terms of *r* and *T*. Solve to find the theoretical relationship between *r* and *T*.

**Lab Assignment**

Given the set up and demonstration of the materials available, your task is to design a method of measuring the variables and determining the relationship described in the purpose statement.

Start by defining the ***Independent*** and ***Dependent*** variables measured in this lab.

Design a method (or use the example attached) of measuring these variables and how to show your data. Provide a procedure and explanation of how you will show your data. You may choose to design two methods and use them to compare and contrast measuring methods.

Do your experiment (at least once) and use the data you obtained as an example.

**What Your Submission Will Look Like**

Only need one of these per group:

* Lab Title
* Purpose Statement
* Identification of Independent and Dependent variables
* Procedure (as a numbered list)
* Data Communication Explanation (with your example)

Each individual will answer these separately:

* Follow Up Questions

**Follow Up Questions**

Consider how you are measuring the independent and dependent variables.

1. **Initial Assumptions of the Situation**
   1. What are the initial assumptions you are making when measuring your results?
   2. Are these assumptions wholly correct? What sort of uncertainty may these assumptions introduce? What is the estimated size of this uncertainty (can be qualitative in description)?
2. **Measuring Methods**
   1. What are the tools (physical objects) you are using for the measurement of your variables?
   2. What are the inherent sources of uncertainty in your tools? What sort of uncertainty does this tool introduce? What is the estimated size of this uncertainty?
   3. What methods are you using for measuring your variables?
   4. Does your method have an inherent source of uncertainty? What sort of uncertainty does this method introduce? What is the estimated size of this uncertainty?
   5. Does your method reduce inherent sources of uncertainty? How does this reduce uncertainty?
3. **Data Communication**
   1. Why did you chose to communicate your data as you did?
   2. Does your communication of data allow for estimation of error? How can you look at the data you’ve acquired and tell if your results agree with the theoretical model?

The purpose of this lab activity is to get you to fully consider the import of your choices in tools and analysis of any observations of the physical world. Feel free to order your questions and answers in any method that works best for your communication.