Name: _____ Period:_____

Honors Physics Lab: Finding g with Centripetal Force

Purpose: This is a verification lab, which means you will be using data to confirm a known quantity. In this case, we want to find the acceleration due to gravity near Earth's surface (g).

Pre-Lab

1. A stopper revolves on the end of string in a circle of radius r = 0.80 m. How far does it actually travel in one revolution?

2. If that stopper makes ten revolutions in 4 seconds, what is its period?

3. What is the velocity of that stopper?

4. If that stopper has a mass of 0.009 kg, how much centripetal force is required for it to travel this circle this fast?

5. Let's say that the string attached to the stopper goes through a tube and then hangs down. On the hanging end is a mass. What does the **weight** of that mass need to be to maintain the circle?

6. The mass you hang on the string has a mass of 0.007 kg. What is the acceleration of gravity? Is this on Earth?

Procedure: Write your own and attach it to this sheet! Write it like a cookbook, with numbered steps. Here are some

things to keep in mind:

- You want to find g, the acceleration of gravity. Will this change if you change other things?
- It is really hard to time just one revolution. What can you do about that?
- How can you ensure that the radius doesn't change while you're spinning the stopper?
- Tape on the string near the tube can hold the string in place. In that case, would all of the force be coming from the hanging weight? Does it need to?
- There will be random errors in your measurements. What can you do to compensate?

Data Table: Make your own and attach it to this sheet! Make sure you LABEL your columns and rows!

Analysis Questions:

1. What is your calculated value for the acceleration of gravity? (Do your math in your notes. Don't turn it in.)

2. Find the percent error for your calculated value. To do this find the difference between your value and the accepted value ($g = 9.8\ m/s^2$), then divide by the accepted value. Turn that decimal into a percentage.

3. Name one error that might explain why your calculated value is not exactly the same as the accepted value. How did this error affect your data (what did it do to the numbers) so that your answer came out wrong?

4. What could you do to reduce or eliminate this error? This fix could either be something you physically do differently in the lab or a math fix with the data itself.