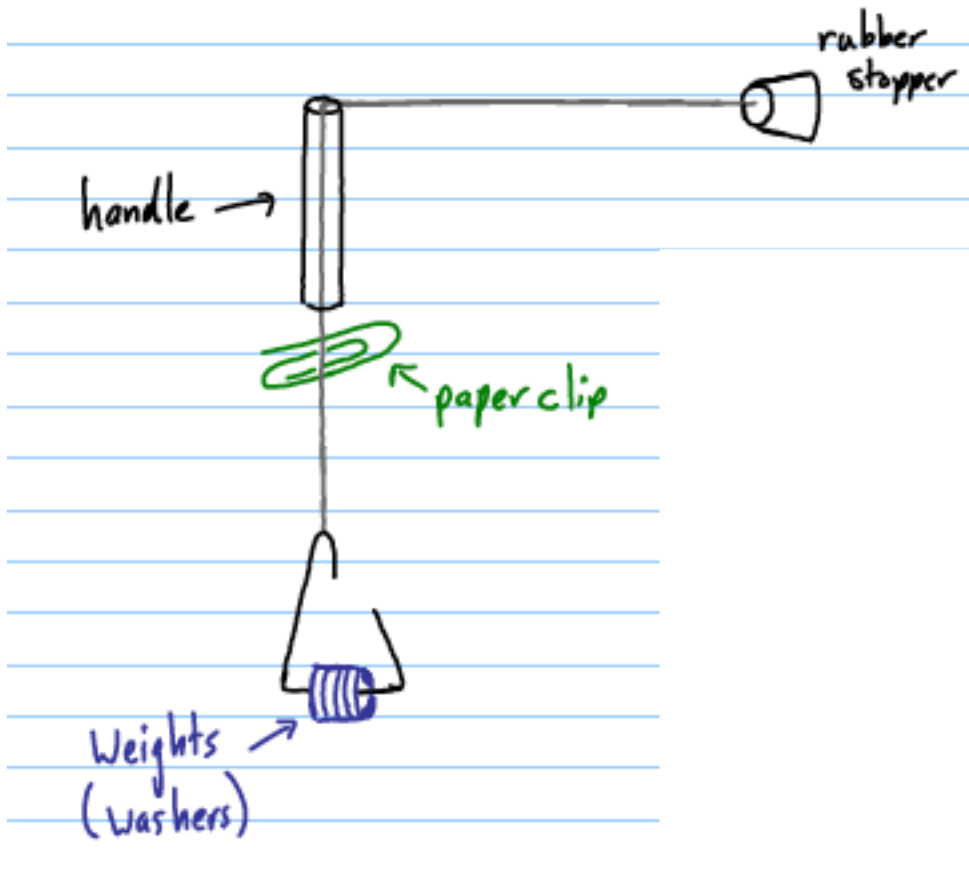


Mini-Lab: Centripetal Force

Procedure

Set up your lab as shown below and in the demo:



Data:

Mass of rubber stopper (kg)

Total mass of washers (kg)

Period for 20 revolutions (s)

Speed of rubber stopper (m/s)

- 1) Determine the mass of the rubber stopper and the mass of _____ washers.
- 2) Measure 0.40m of string from the stopper to the handle. Place a paper clip on the under side of the handle ~1 cm away from the bottom of the handle.
- 3) Tie your washers to the lose end of the string going down the handle.
- 4) Start spinning the rubber stopper while holding on to the string connecting the washers. Make sure to getting a horizontal swing when the paper clip is ~1cm from the bottom of the handle. Answer discussion question #1.
- 5) Determine the time for 20 complete revolutions. Calculate the period and then the speed of the rubber stopper.
- 6) Give your data to your teacher and complete the rest of the discussion questions.
- 7) Take a picture of the class graph generated on the screen. Make sure you get the value of the slope clearly in your picture.

Discussion questions

1) What happens when you spin faster? What happens to the rotational radius?

2) What are 2 sources of error in this lab? How did these errors impact your results?

3) Make sure to take a picture of the class-generated graph of velocity vs. mass of washers. Describe the shape of the graph produced by the class data set. What kind of mathematical relationship is this?

4) Describe how you should re-plot the graph so you can straighten out the curve.

5) After straightening out the curve, what quantities is the slope equal to? *Hint: start with $F(g)_{washer} = m_{rubber}v^2/r$ and solve for v . Don't forget the straightened curve plots v versus $m_{washer}^{0.5}$.*

6) Record the slope from the straightened curve below. Use this value to calculate the value of the mass of the rubber stopper (m_{rubber}). Calculate the percentage error compared to your actual measurement of the rubber stopper. How satisfied are you with the result and why?
