NAME_____ DATE_____
PHYSICS A/R -- PERIOD ____

# LABORATORY 14
# Centripetal Force I

## Objective
To determine what relationship exists between centripetal force ($F_c$) and the velocity of an object traveling in a circular path with constant speed.

## Diagram
Draw laboratory setup in your lab notebook.

## Safety
You must wear goggles for this experiment.

## Procedure
1. Level the apparatus.

2. Hang the black mass from the end of the horizontal bar by a cord. Be sure the cord is attached properly to the bar.

3. Allow the black mass to hang freely and move the pointer so it is aligned with the point on the bottom of the mass.

4. Attach a spring to the vertical pole on the grooved area of the pole. Attach the other end of the spring to an eyelet on the black mass.

5. Attach a cord to a paper clip and hook the paper clip to the other eyelet on the black mass. Run the cord over the pulley and place a weight hanger on the end of the cord.

6. Add mass to the weight hanger until the black masses' pointer is once again aligned with the pointer. Note the force being exerted on the spring to stretch it ($F_c$).

7. Measure the distance from the center of the vertical pole to the pointer. Enter this under radius.

8. **Slowly** begin rotating the apparatus until the pointer and the bottom point of the black mass is aligned. Once this occurs maintain this velocity and find the time necessary for 50 revolutions. UNDER NO CONDITION IS THE DEVICE TO ROTATE FASTER THAN THIS OR ROTATED WITHOUT THE SPRING BEING ATTACHED IN ORDER TO PREVENT INJURY TO YOURSELF OR OTHERS.

9. Find the time required for one revolution.

10. Find the velocity of the black mass. (Velocity = $2\pi$ × radius / Period) ($v = 2\pi r / T$)

11. Repeat the experiment two more times using two different springs.

12. Plot $F_c$ (N) (x-axis) versus Velocity (m/s) (y-axis).