Circular Motion

Objectives: Determine relationship between linear velocity, angular speed, centripetal force and acceleration.

Equipment: stopwatch (calculator), F_c setup (tube and string with rubber stopper), mass set

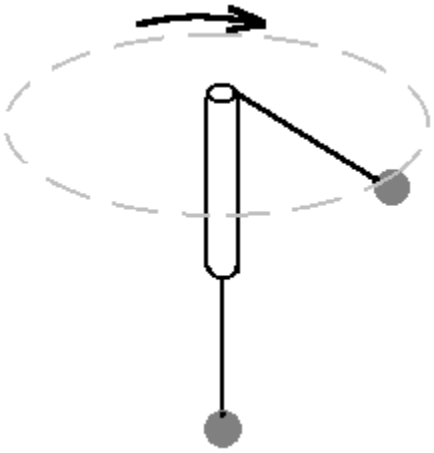
Methods:

1. On a separate sheet of paper sketch the F_c setup shown to the right and create a chart for your data. (see example below)

2. Hang a 50.0 g mass on the F_c set up. This mass represents F_c.

3. Whirl and time the stopper for 10 revs in a horizontal circle while balancing the 50.0 g mass. Be sure the reference washer does not touch the handle.

4. Determine T, measure r, then calculate F_c, v, and a_c. The radius remains constant in this lab.



5. Repeat for various masses to get 5 trials (max. 250 g).

Analysis:

1. Plot graphs of:

(a) F_c vs a_c (a_c on the x axis)

(b) v^2 vs a_c (a_c on the x axis)

2. Describe the relationship for each graph. Calculate the slopes for each. What do the slopes represent? (Hint: look at the units for y/ x, then examine your data).

3. Describe how adjustments in the radius r would affect the mass's velocity given the same F_c.

Sample Data Table

Mass of the stopper_____

radius _____m;

F_c = (mass of weight) (9.8 m/s/s)

Circumference (C) = 2π r

T = time/revs

v = C / T

mass	F_c	revs	time	T	v	v^2	a_c	ω
50.0g	0.49	10	7.2s	0.72s				