*Name*_____   *Date*_____

11.1 FORCE AND CIRCULAR MOTION

PURPOSE: To learn about the special force and properties of circular motion

SUPPLIES: Page 260 of textbook

PROCEDURES: page 260-261 of textbook , 2nd edition

DATA: **Part I** - Adjust the rate of twirling until the black mark on the string is visible just at the bottom of the pen casing (with approximately 6 inches of string on top to the washer). Use the stopwatch to time how long it takes the washer to complete 20 full revolutions. Do five trials and find the average.

Trial	Total time for 20 revolutions with 2 washers
# 1	
# 2	
# 3	
# 4	
# 5	

The average time to make 20 full revolutions with 2 washers as the bottom mass is

_____ .

Part II – Attach 2 more washers on the bottom end of the string for a total of 4 washers. Make a prediction of how your timed trials will be different with the addition of two more washers. Repeat the same five trials and find the average.

Prediction: I think with four washers at the end of the string that:

_____

Trial	Total time for 20 revolutions with 4 washers
# 1	
# 2	
# 3	
# 4	
# 5	

The average time to make 20 full revolutions with 4 washers as the bottom mass is

_____ .

Compare the speed of revolutions of two washers and four washers:

_____

_____

Part III –

What is your average speed from Part I? _____

Try to twirl the washer (with the 4 washers at the bottom) so that the time it takes the washer to make 20 full revolutions is EQUAL to what your average time in <u>Part I</u>. This may be challenging. Try to get reasonably close so you can make some observations and answer the following questions.

    When you reach the same speed from Part I, where is the black mark?

    _____

    Compare the size of the circles from Part I and Part III.

    _____

Part IV – Draw a line predicting which direction the twirling top washer would go if you cut the string the four bottom washers.
(Tip: Apply Newton's 1st Law)
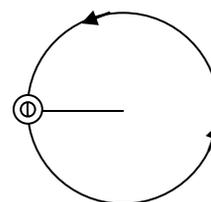
Part V - <u>Define centripetal force</u> – (page 261, 2nd edition)

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Part VI - Evaluate how the results from your experiment are demonstrated in the principles below:

    1. Circular motion requires centripetal force.

    2. The larger the centripetal force, the faster an object travels in a circle of a given size.

    3. At a given speed, the larger the centripetal force, the smaller the circle.