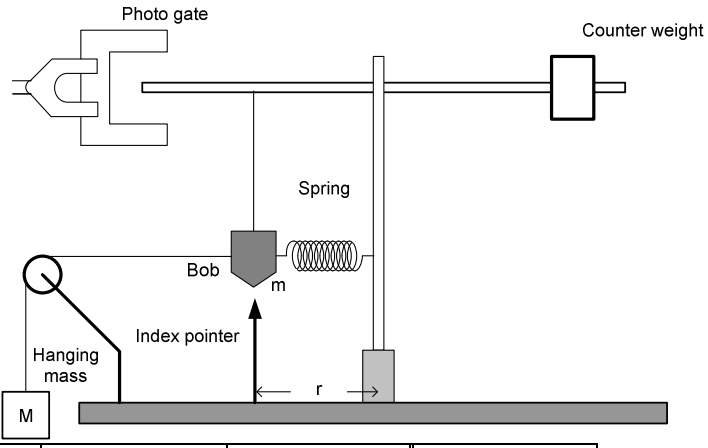
Centripetal Force (Uniform Circular Motion)

Name_____TA_____

Partners_____

Section#_____Date_____

1. Measurement of Centripetal Force



g (Gravitational accel.) = _____ (m/s^2)

m (Mass of bob) = _____ (kg)

	r radius of orbit	T period	$v = 2\pi r/T$ tangential speed	$F_c = mv^2/r$ centripetal force	M hanging mass	Mg	Mgr/v^2
1							
2							
3							
4							
5							
6							
7							
8							
9							

2. Analysis and questions

Average and standard deviation of the last column, (Mgr/v^2): *See Appendix.*

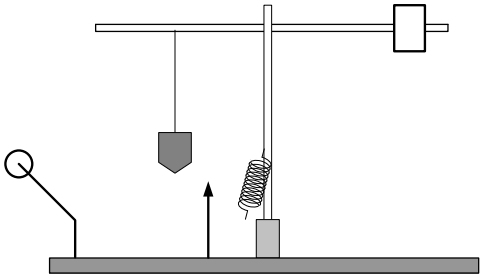
(±) ( ) ⇐ write the unit

Question 1: What is the unit for the value of Mgr/v^2 ?

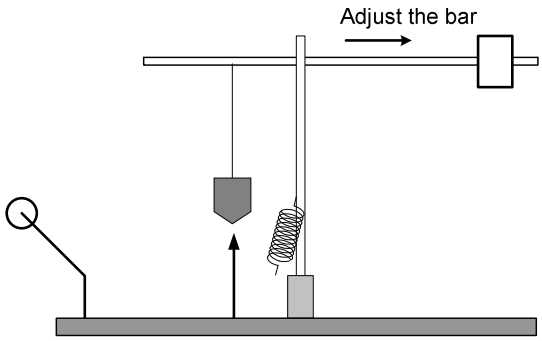
Question 2: Is this value agreed to the mass of the bob within the standard deviation?

Lab Procedure for Centripetal Motion

1. Set up the position of index point.

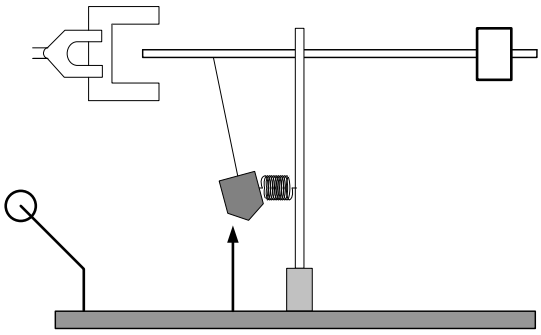


⇐ Take the spring off from the bob. Determine the radius of rotation with the index pointer.



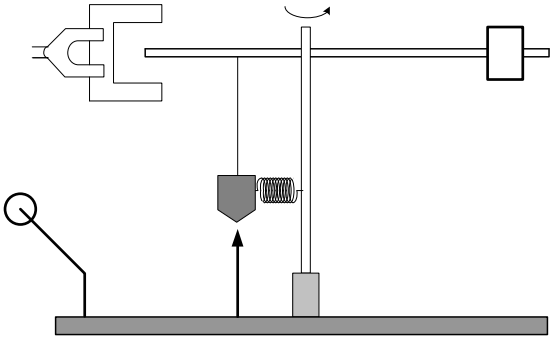
2. Adjust the horizontal bar.

The bar has to be adjusted before rotation so that the pointed tip on the bottom of the bob is just over the index pointer as shown. The counter weight may be placed for a stable rotation, too. ⇒



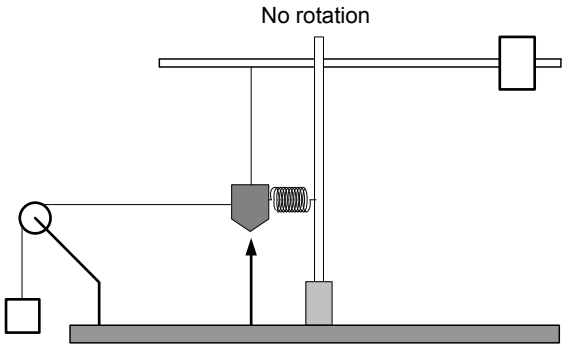
3. Hook up the spring.

⇐ After hooking the spring, set up the photo gate as shown. Then, rotate the vertical bar.



4. Spin the bar and measure the period.

After the pointer and tip of the bob are lined up, make sure that the recorded period is stable. If needed, calculate the average with a few data. ⇒



5. Stop the rotation and hang a weight.

⇐ To know the centripetal force, hang masses to the other side until the bob and pointer are lined up. The force will be the mass × gravitational acceleration.

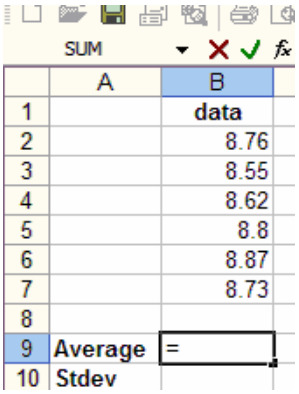
6. Repeat the above procedure after changing the position of pointer.

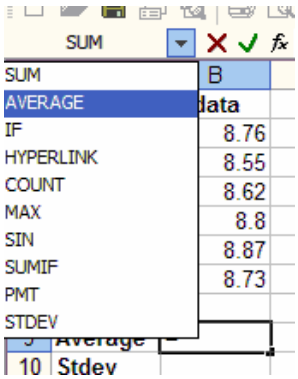
Appendix: How to obtain average & standard deviation with Excel

	A	B
1		data
2		8.76
3		8.55
4		8.62
5		8.8
6		8.87
7		8.73
8		
9	Average	
10	Stdev	
11		

1. Put the data and label as follows (to avoid mistakes). ⇐

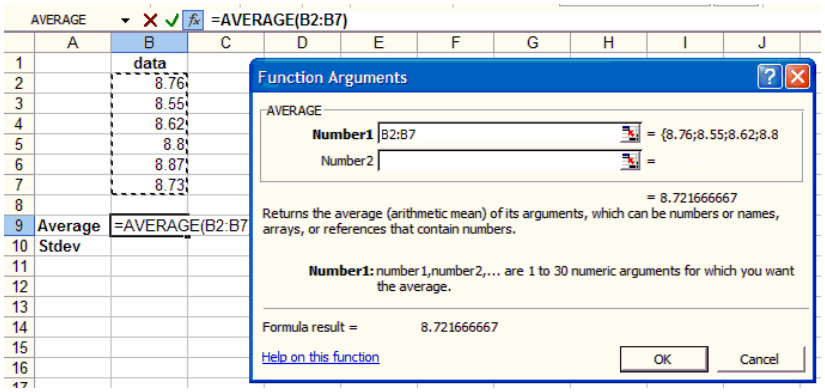
2. For the average, go to the cell and press "=." (Note: it is the '=' sign on the keyboard.) ⇒

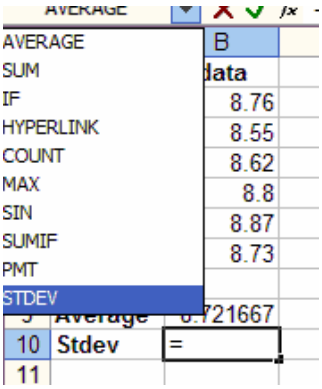




3. Go to the "Function Box" and select "AVERAGE." ⇐

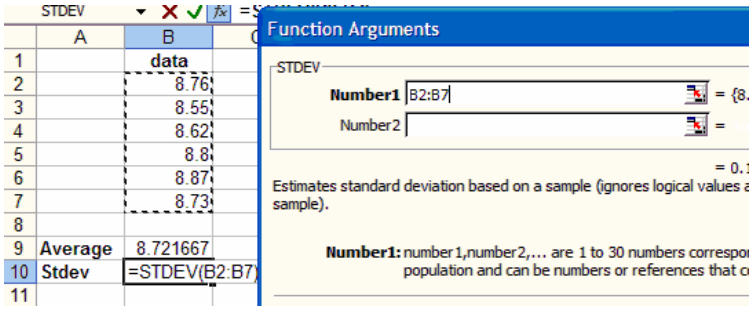
4. After "Function Arguments" popped up, select all the data with mouse pointer. Then click OK. ⇒





5. Do the same thing for the standard deviation. Press "=" and go to "Function Box." Then select "STDEV." ⇐

6. Select the data. Then click OK. ⇒



	A	B
1		data
2		8.76
3		8.55
4		8.62
5		8.8
6		8.87
7		8.73
8		
9	Average	8.721667
10	Stdev	0.117884

7. Then, you will have following. ⇐