Lab – Relating linear quantities to rotational quantities **Name _____**

Radius of large pulley is 2.38 cm. Make sure your string is always on the large pulley.

1. Open "Rotational Motion". Save "rotation1, 2, and 3" to the desktop. Run "rotation1"
2. Raise the rotational motion sensor until the bottom of the hanger is just skimming the tabletop. Click 'start'.
3. Wind the string up onto the largest pulley by rotating the disk. Make sure the string goes only on the large pulley. Stop when the bottom of the hanger gets to 15 cm, 30 cm, 45 cm, and 60 cm or whatever four values you choose.
4. Hold the disk steady at each level for a few seconds. Click stop when all four measurements are completed.
5. RECORD the four pairs of **s** and **q** data.
6. Write an equation relating **s**, **r**, and **q**.

s				
r				
q				

Find the relationship between v (linear velocity in meters) and w (angular velocity in radians)

1. Run 'rotation2".
2. Wind the string up onto the largest pulley by rotating the disk. Make sure the string goes only on the large pulley until it is about 60 or 70 cm above the table. Stop the hanger from swinging.
3. Click 'start'. Release the disk so the mass can fall. Click 'stop' just as it hits the table. Grab the disk so the mass does not get out of control.
4. Click on the slope tool. When it asks if you want it to force your grid to be square, click NO! Choose a point on the linear position graph where you are going to take the slope. Click on your smart cursor and drag it to the point. RECORD the time for the point. Drag your slope tool to that point. The point will be just to the left of the [. RECORD the slope. Do this for 4 points. At this same 'time', also find and RECORD the slope on the angular velocity graph. Do this for the same 4 points.
5. Write an equation relating **v**, **r**, and **w**.

t				
v				
r				
w				

Find the relationship between 'a' (linear acceleration) and 'a ' (angular acceleration in radian/s^2)

1. Run 'rotation3'.
2. Wind the string up onto the largest pulley by rotating the disk. Make sure the string goes only on the large pulley until it is about 60 or 70 cm above the table. Stop the hanger from swinging.
3. Click 'start'. Release the disk so the mass can fall. Click 'stop' just as it hits the table. Grab the disk so the mass does not get out of control.
4. Find the slope of the straight part of the velocity graph. RECORD. The slope for v is given in m/s but it is easier to see the relationship if you use cm/s. Also find the slope on the angular velocity graph and RECORD. Notice that you will only have ONE set of values.
5. How would you get more values? Try it and see what happens.
6. Write an equation relating **a**, **r**, and **a** .

a				
r				
a				