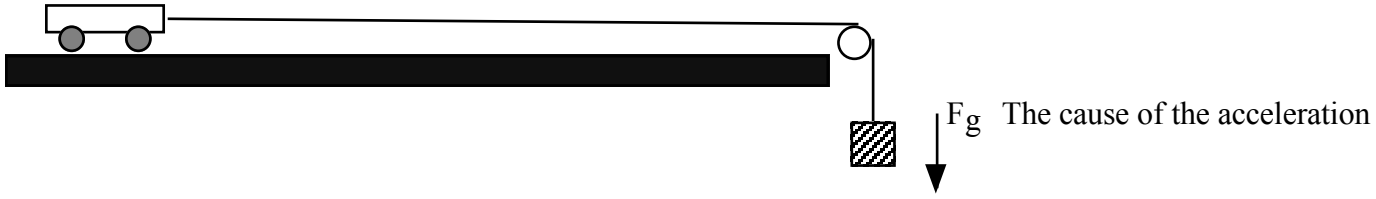
Name _____ Partner _____ Date _____

Around and Around

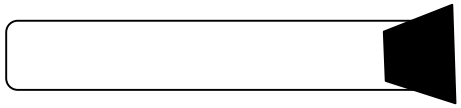
**Purpose:** To determine the direction of the acceleration and the force in uniform circular motion.
To understand the equation for acceleration in uniform circular motion.

**Procedure A:** Calibrate an inexpensive accelerometer (measures acceleration). The accelerometer is a simple test tube about 1/2 full of water. The water will "move" when it is accelerated (why? – you should explain why in your summary). For your data draw a sketch of the accelerometer, making special notes to the direction and size of the acceleration in relation to each drawing.

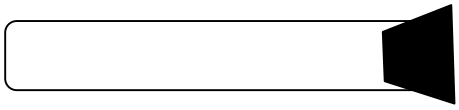



Make a free body diagram of the cart on the above drawing. Write the net force equation in the space below.

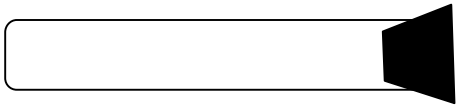
Data 1 – draw a sketch of the accelerometer with the first (smallest) weight. **Make sure to note the direction of the net force and acceleration!**



Data 2 – draw a sketch of the accelerometer with the second (middle) weight. **Make sure to note the direction of the net force and acceleration!**

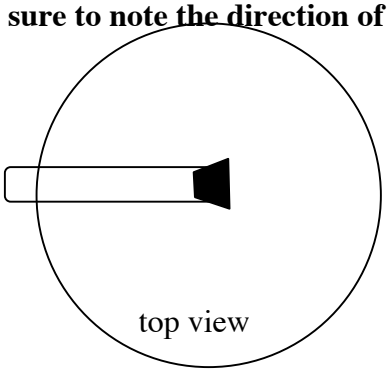


Data 3 – draw a sketch of the accelerometer with the third (largest) weight. **Make sure to note the direction of the net force and acceleration!**



**Procedure B:** Move to the setup with the turntable. Fasten the accelerometer to the turntable so that the stopper end of the accelerometer is at the center of the turntable. Draw a free body diagram for the accelerometer.

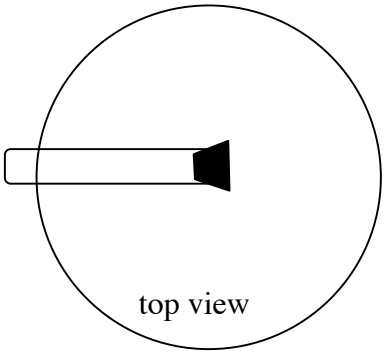
Data 4 – draw a sketch of the accelerometer with the first (smallest) speed from both a top view and a side view. **Make sure to note the direction of the net force and acceleration** – use your data from Part A to help you.



top view

side view

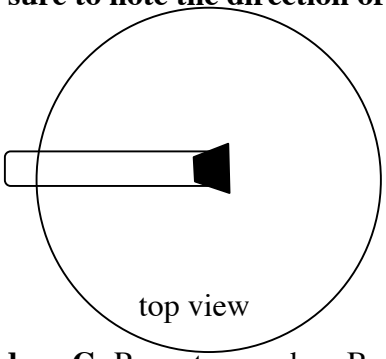
Data 5 – draw a sketch of the accelerometer with the second (middle) speed from both a top view and a side view. **Make sure to note the direction of the net force and acceleration** – use your data from Part A to help you.



top view

side view

Data 6 – draw a sketch of the accelerometer with the third (largest) speed from both a top view and a side view. **Make sure to note the direction of the net force and acceleration** – use your data from Part A to help you.

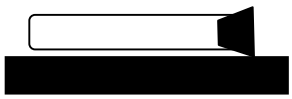


top view

side view

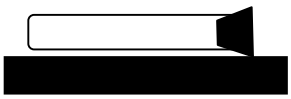
**Procedure C:** Repeat procedure B except this time put the accelerometer on the turntable so that the middle of the accelerometer is at the middle of the table. Sketch the side view **and be sure to note the direction of the net force and the acceleration.**

Data 7



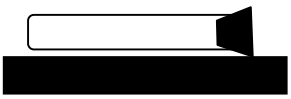
side view

Data 8



side view

Data 9



side view

Summary Help: - what you learned (**HINT – look at the purpose!)**

Summary:

1. What happens to the water in the accelerometer when a force is applied? Why?
2. What direction does the water go in linear acceleration?
3. What happens to the water when the acceleration is greater in linear acceleration?
4. What is the direction of the water in uniform circular motion?
5. What is the direction of the acceleration (and the force) in uniform circular motion?
6. What happens to the size of the acceleration in uniform circular motion when the speed is increased?
7. How can there be acceleration if the speed is constant (uniform)?