

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Course: \_\_\_\_\_ Professor: \_\_\_\_\_

## M20a Prelab: Centripetal Force and Uniform Circular Motion



**Read the lab instructions, the appropriate sections from your textbook and watch the videos before answering the questions.**

**Your answers must be typed; equations can be handwritten.**

Answer following questions:

- 1) Describe the **centripetal acceleration** and provide the equation that relates the centripetal acceleration to tangential speed and radius of rotation.
- 2) Describe the **centripetal force** and provide the equation that relates the centripetal force to tangential speed, mass and radius of rotation.
- 3) In the laboratory handout instructions from step 2 to 10, you are required to adjust the apparatus in order to have the suspended mass in equilibrium while is attached to the hanging mass. Draw a simple schematic sketch of the apparatus on this condition and label the suspended mass and the hanging mass on your sketch. Draw a free body diagram for each mass.
- 4) Which force is playing a role of the centripetal force in the experiment? (weight, tension, normal force, etc.) Using the free body diagrams from previous question, find the equation that will be used to calculate this force.
- 5) What is the expected shape of a graph of a tangential speed (on y-axis) versus centripetal force (on x-axis) in the experiment? (linear, parabolic, exponential, etc.). Support your conclusion with appropriate derivations and explanations.
- 6) What is the expected shape of a graph of the centripetal force (on y-axis) versus tangential velocity squared (on x-axis) in the experiment? (linear, parabolic, exponential, etc.). Support your conclusion with appropriate derivations and explanations.