

Name: \_\_\_\_\_

## **Unit 1: Newtonian Mechanics – Kinematics in One Dimension**

### **LAB 1: Uniform vs. Accelerated Motion**

Objectives: Students will...

- Compare uniform and accelerated one-dimensional motion in inertial reference frames using graphical analysis.
- Gain competency using lab software and equipment.
- Gain competency in communicating effectively as a scientist when writing lab reports.

Equipment:

- PASCO system with Smart Cart and track

Procedure:

- Create graphs of position v time, velocity v time, and acceleration v time for both uniform and accelerated motion.
- Measure the slopes and means of each of the six graphs only during the time period when the motion was occurring.
- From the uniform motion graphs, choose one instant of time and measure...
  - The instantaneous slope of the position v time graph.
  - The instantaneous velocity from the velocity v time graph.
- From the accelerated motion graphs, choose one instant of time and measure...
  - The instantaneous slope of the velocity v time graph.
  - The instantaneous acceleration from the acceleration v time graph.

Data:

- Print graphs of position v time, velocity v time, and acceleration v time for both uniform and accelerated motion. Attach them to this document.
- Record all measurements in one or more data tables of your own design in the space below. Be sure that your rows or columns are headed properly and that your tables are well-organized and easy to read. It is recommended that you draft your tables on dry erase boards and get them approved by your teacher before writing anything in the space below. Pro-tip: Rulers are good tools for making your tables readable.

Calculations: Calculate a percent difference between each of the following values.

1. The slope of position v time and the mean velocity from the uniform motion graphs.
2. The instantaneous slope of the position v time graph and the instantaneous velocity of the velocity v time graph from the uniform motion graphs.
3. The slope of velocity v time and the mean acceleration for the accelerated motion graph.
4. The instantaneous slope of the velocity v time graph and the instantaneous acceleration of the acceleration v time graph from the accelerated motion graphs.

