Name_____ **Period**

Acceleration Lab

Introduction: Acceleration is the rate of change in velocity (speed and direction). It is calculated by subtracting the initial velocity from the final velocity and dividing this by the time it took for the change. In this lab we are going to equate speed and velocity.

Purpose:

1. To calculate acceleration from collected data.
2. To analyze the data and calculated values.
3. To compare the accelerations produced by ramps of different heights.

General Instructions: (Read the entire Lab handout before beginning.)

1. Collect your materials from the teacher.
2. Set up materials for each set of trials.
3. Create a data chart for each set of trials.
4. Collect data.
5. Do calculations.
6. Write Lab report, analyze data, and answer lab questions as part of the Conclusion.

Procedures:

1. Start your Lab report. Write a problem statement that makes sense and that you can form a testable hypothesis for. Write a hypothesis that answers the problem and is tested by the experiment.
2. Set up a ramp that is 2 Science books high at one end.
3. Allow a tennis ball to roll down the ramp freely.
4. Collect and record times at .5 meters and 1 meter.
5. Repeat two times.
6. Find the average times for each distance.
7. Find the speed at each distance by dividing the distance by the average time.
8. Find the acceleration at each distance by dividing the speed just calculated by the time it took to reach that speed.
9. Repeat steps 2-8 for a ramp that is 4 Science books high.
10. Finish your Lab report. Use proper Lab Report format. Make one Distance vs Time graph that displays the data from both ramps. Include the answers to the questions below in your Conclusion.

Data Chart: (You will need two, one for each ramp height.)

Ramp One

Distance (m)	**Time 1** (s)	**Time 2** (s)	**Time 3** (s)	**Speed** (m/s)	**Acceleration** (m/s^2)
0					
0.5					
1					

Analysis Questions:

1. What kind of speed did you calculate in step 7? Is this truly the speed of the tennis ball at that point? If not, is there a way to adjust your calculations to make it more accurate?
2. What initial velocity did you use in step 8? Why?
3. Do you think the acceleration you calculated in step 8 is an accurate value? Why or why not? Be specific; discuss the experiment and the data used to make the calculation.
4. Compare the data collected and calculated for the ramps of different heights. Are the times, speeds, and accelerations similar or different for the two ramps? How? What does this mean? Do your results make sense? (Be specific for each value; time, speed, and acceleration.)
5. Why does the tennis ball accelerate down the ramp? Should it accelerate differently on the two ramps?

Extension (Extra Credit):

1. Create two more graphs (different from the Distance/Time graph) that display your data.
2. Collect one more set of data, for a ramp 6 books high, within the allotted time. Include this data in your analysis.