Acceleration Due to Gravity

As you work through the steps in the lab procedure, record your experimental values and the results on this worksheet. Use the exact values you record for your data to make later calculations.

A: Measuring the Acceleration of the Cart on an Incline

Upload your data. (Submit a file with a maximum size of 1 MB. *You will upload this file in the WebAssign question.*)

B: Determine the Average Acceleration Using the Acceleration Graph

Record the time range over which the value of the acceleration is behaving as though it is a constant.

Record the acceleration for 8 points in this time interval. (Enter your time values in increasing numerical order and at least 0.1 seconds apart.)

Table 1

Point	**Time, t (s)**	**Acceleration, a (m/s^2)**
1		
2		
3		
4		
5		
6		
7		
8		

Calculate the average acceleration and the standard deviation using these 8 points.

C: Determine the Average Acceleration Using the Velocity Graph

Using the velocity graph, determine the average acceleration for the same time interval as in part B.

Do the values for average acceleration agree? (Choose "Yes" if the two values for average acceleration agree to within the standard deviations. Otherwise, choose "No.")

How might you account for any disagreement between the two results for the average acceleration?

D: Determine *g* from Average Acceleration of the Cart on an Incline

Upload your data. (Submit a file with a maximum size of 1 MB. *You will upload this file in the WebAssign question.*)

Record the time range where the cart is rolling with a uniform acceleration.

Record an interval of your $v(t)$ data that is between the time at which you released the cart and the *turning point*-the time at which the cart momentarily stopped and changed direction.

Record the acceleration, a, of the cart and its standard deviation Δa in Table 2.

Table 2

Trial	**Acceleration (m/s^2)**	
	Uphill	**Downhill**
1		
2		
3		

Record the angle of the incline of the track.

Calculate the corresponding values of g for the data in Table 2.

Table 3

Trial	***g*** **(m/s^2)**	
	Uphill	**Downhill**
1		
2		
3		

Calculate and record the average value for the acceleration and the average value for g along with their respective standard deviations for our measurements in Table 4.

Table 4

	Uphill	**Downhill**
Average Acceleration (m/s^2)		
Average g (m/s^2)		

Do your "uphill" and "downhill" measurements produce the same results? (Choose "Yes" if the "uphill" and "downhill" averages for g agree to within uncertainty. Otherwise, choose "No.")

Discuss.

Upload your sketch of the free body diagrams. (Submit a file with a maximum size of 1 MB. *You will upload this file in the WebAssign question.*)