

Linear Motion

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.

Part 1. Constant Velocity Motion - Data

Record the selected time values, t_1 and t_2 , and the corresponding positions, x_1 and x_2 .

Table 1

Position	Time	t (s)	Position	x (m)
1	t_1		x_1	
2	t_2		x_2	

Record the two consecutive data points that you selected from somewhere at the beginning of the cart's movement.

Table 2

Position	Time	T (s)	Position	X (m)
1	T_1		X_1	
2	T_2		X_2	

Record the two consecutive data points that you selected from somewhere at the end of the cart's movement.

Table 3

Position	Time	t' (s)	Position	x' (m)
1	t'_1		x'_1	
2	t'_2		x'_2	

Record the y -intercept and slope from the position vs time graph.

What does the slope of the position vs time graph mean?

Record the mean value from the statistics of the velocity vs time graph.

Part 2. Uniformly Accelerated Motion - Data

Record the numerical values of the fit parameters for the position versus time graph of the sail cart's motion.

Table 4

Parameters	Values	Units	Physical quantity
A			
B			
C			

Record the slope and y-intercept of the velocity versus time graph of the sail cart's motion.

Table 5

Parameters	Values	Units	Physical quantity
Slope			
<i>y</i>-intercept			

What does the slope of this velocity versus time graph mean?

Part 3. Free Fall - A. Stairway - Data

Rubber Object

Record the height from which the rubber object is dropped.

Record the measured time of the free fall motion for the rubber object.

Table 6

Trial	Time (s)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Record the mean value of time of the rubber object that was found using statistics in GA.

Record the standard deviation of the value of time of the rubber object provided by GA.

Calculate the uncertainty of the value of time of the whiffle ball.

Whiffle Ball

Record the height from which the whiffle ball is dropped.

Record the measured time of the free fall motion for the whiffle ball.

Table 7

Trial	Time (s)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Record the mean value of time of the whiffle ball that was found using statistics in GA.

Record the standard deviation of the value of time of the whiffle ball provided by GA.

Calculate the uncertainty of the value of time of the whiffle ball.

Part 3. Free fall - B. Photogate - Data

Record the slope of velocity vs time graph for your five trials. Uncertainty doesn't need to be included.

Table 8

Trial	Slope (m/s²)
1	
2	
3	
4	
5	

Record the mean value of the free fall acceleration.

Record the standard deviation of the value of time provided by GA.

What does the slope of the velocity vs time graph represent in this experiment?

Graphs

Upload the file with your graphs. Do a print screen and save the graphs as a file with a maximum size of 1 MB. (*You will upload this file in the WebAssign question.*) Print the graph for your TA to sign, and for your reference.