Name _____

A Simple Examination of Freefall

Introduction:

Anything falling under the influence of gravity is considered to be in freefall. Under the influence of gravity, an object will experience an increase in velocity of 9.8 m/s each second. In other words the acceleration of gravity (g) is 9.8 m/s^2.

With careful measurements, the acceleration of gravity can be determined fairly accurately.

Equipment:

Masking tape
Meter stick
Coin
Stopwatch

Procedure:

Take 5 pieces of tape and place one each at 0.6m, 0.9m, 1.2m, 1.5m, and 1.8m horizontally along the wall. Each group member will then take a turn dropping the coin once from each of these heights. Be sure to hold the coin at the bottom edge of the tape and verify this at eye level. The person holding the coin should also be the one timing the drop. Make sure to record the time after each trial.

Data:

Trial	Time (s)	Trial	Time (s)	Trial	Time (s)	Trial	Time (s)	Trial	Time (s)
1		1		1		1		1	
2		2		2		2		2	
3		3		3		3		3	
4		4		4		4		4	
5		5		5		5		5	

Table 1: Time measurements for determining acceleration of gravity

Height (m)	Lab Partner1 (s)	Lab Partner2 (s)	Lab Partner3 (s)	Lab Partner4 (s)	Lab Partner5 (s)	t_{avg}	s_x
0.6							
0.9							
1.2							
1.5							
1.8							

Table 2: Summary of collected data

We can now treat this like a traditional word problem:

You drop an object from some height **h** and the amount of time it takes before hitting the ground is **t**. Assuming **h** and **t** are known quantities, find the acceleration of gravity (**g**).

[You should find that the appropriate expression is $g = \dfrac{2\Delta y}{t^2}$.]

Attach a dynamics worksheet with the solution. Before moving onto the final part check with the instructor to make sure your dynamics worksheet is complete.

Finally, you can solve for the acceleration of gravity.

Height (m)	t_{avg}	g	% error
0.6			
0.9			
1.2			
1.5			
1.8			

Table 3: Final Calculation of Acceleration of Gravity

Sample Calculations: