Intro to Free Fall Lab

Introduction – You just learned that an object that is dropped will have a constant acceleration of 9.8 m/s/s. What this means is that for every second an object is falling, it will pick up an extra 9.8 m/s. We can use the formula $d = 1/2gt^2$. So, knowing the time it takes an object to fall, we can calculate the distance it fell from. You will be measuring the heights of objects today by throwing a ball to the top of the objects and timing how long it will travel.

Materials

1. Stopwatch
2. Tennis ball
3. Data tables

Procedure

1. Find a tall object that you want to measure, but can't because it is too tall.
2. Have your partner step away from the object so they can judge if your toss reaches the top of the object.
3. Toss your tennis ball so you make it just to the top of the object while your partner times how long it takes the ball to leave your hand, reach the top, and fall to the ground.
4. Divide this time by 2!! This will be the time it takes the object to fall to the ground.
5. Fill in the data table and make calculations.
6. Do three trials for each object.
7. Pick 5 objects (find at least three that you can find the height of).

Data Table

Object	Trial	Time	Calculated Height
	1		
	2		
	3		
	Ave:	Ave:	Ave:
Actual Height and Percent Error Calculation for this Object:			

$$\%\ \text{error} = \left| \frac{\#\,\text{experimental} - \#\,\text{actual}}{\#\,\text{actual}} \right| \times 100$$

Object	Trial	Time	Calculated Height
	1		
	2		
	3		
	Ave:	Ave:	Ave:
Actual Height and Percent Error Calculation for this Object:			

Object	Trial	Time	Calculated Height
	1		
	2		
	3		
	Ave:	Ave:	Ave:
Actual Height and Percent Error Calculation for this Object:			

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	Ave:	Ave:	Ave:
Actual Height and Percent Error Calculation for this Object:			

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	1		
	2		
	3		
	Ave:	Ave:	Ave:
Actual Height and Percent Error Calculation for this Object:			

Post Lab questions

1. What did you find difficult about this lab?

2. What did you learn from this lab?

3. What is the acceleration of an object due to gravity?

4. Why did you have to divide the time by two in order to plug it into the formula?

5. Why did you complete multiple trials for each of the objects?

Known Heights:

Bleachers

Scoreboard (Top)

Football Crossbar

Track Shed

Foul Ball Marker