Acceleration of a Freely Falling Body

Name	_ ID	_TA
Partners		
Date	Section	

1. Test for the effect of air friction

Distance of fall, d =_____(m)

Object	Fall Time	Acceleration	Fall Time	Acceleration
	(Stop Watch)	(Stop Watch)	(Photogate)	(Photogate)
Coffee Filter				

Acceleration = $2d/t^2$

• How does the air friction affect the freely falling objects?

2. Gravitational acceleration g:

Object: _____

1	2	3
Falling distance, d	Fall time, t	t^2
(m)	(Photogate)	$\overline{2}$

> Plot a graph using columns 1 and 2. (Falling distance, d, is y-axis.)

> Plot a graph using columns 1 and 3 this time with Excel spread sheet. The purpose is to obtain the linear fit line and its slope. The slope is supposed to be the gravitational acceleration, g = 9.8 m/s². If you do not know how to obtain the slope with Excel, read the instruction (from next page).

• Compare your results with each other and with the expected value (9.8 m/s^2) .

How to obtain a linear fit line by Excel

1. Type the obtained values for x- and y-axes. Columns A and B are x and y respectively. Then select only the numbers.



2. Click Chart Wizard from the tool bar. Select XY (Scatter) as follows.

ert	Format	Tools	Data	Window	Help		
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	★ 1 Chart Star Ghart Image: Chart Image: Chart Image	Wizard - dard Typ t type: Column Bar Line Pie XY (Scatt Area Doughnul Radar Surface Bubble Stock	er)	of 4 - Ch stom Type	art Type s Chart sub-typ () () () () () () () () () () () () ()	e:	? × alues. Sample
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3. With going through the Chart Wizard, name the graph title, x- and y-axes. After clicking "Finish", you will have the following.



4. Right click one of dots on the graph. Then select "Add Trendline."



5. You will see the following, but you do not have to change anything for that. Then click "Options."

Trend/Regre	ssion type	A Orde	r:	
Linear	L <u>o</u> garithmic	Polynomial	*	
		Perio	d:	
Power	Exponential	Moving Average		
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6. Check the box, "Display equation on chart." Then click "OK."

Add Trendline	<u>?</u> ×
Type Options Trendline name Image: Comparison of the second sec	
Forecast Eorward: 0 Backward: 0 Units Units Set intercept = 0 Set intercept = 0 Set intercept = 0 Display equation on chart Display R-squared value on chart	
OK Cano	:el

7. You will have the line equation on the chart.

