

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)

$$\text{Acceleration} = 2d/t^2$$

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

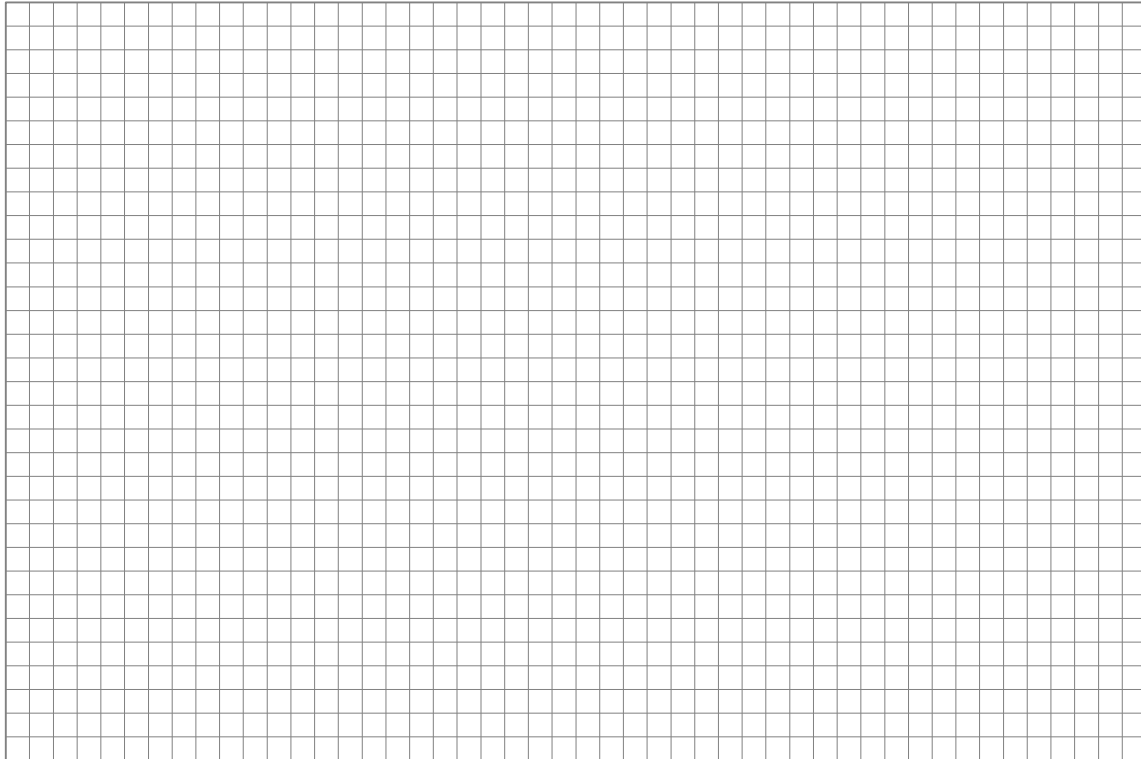
- How does the air friction affect the freely falling objects?

2. Gravitational acceleration g :

Object: _____

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

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

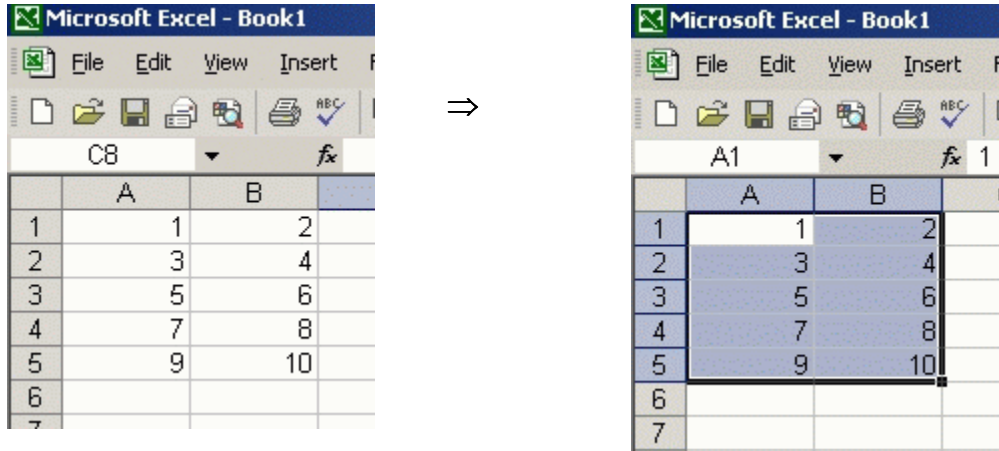


➤ Plot a graph using columns **1** and **3** this time with Excel spread sheet. The purpose is to obtain the linear fit line and its slope. The slope is supposed to be the gravitational acceleration, $g = 9.8 \text{ m/s}^2$. If you do not know how to obtain the slope with Excel, read the instruction (from next page).

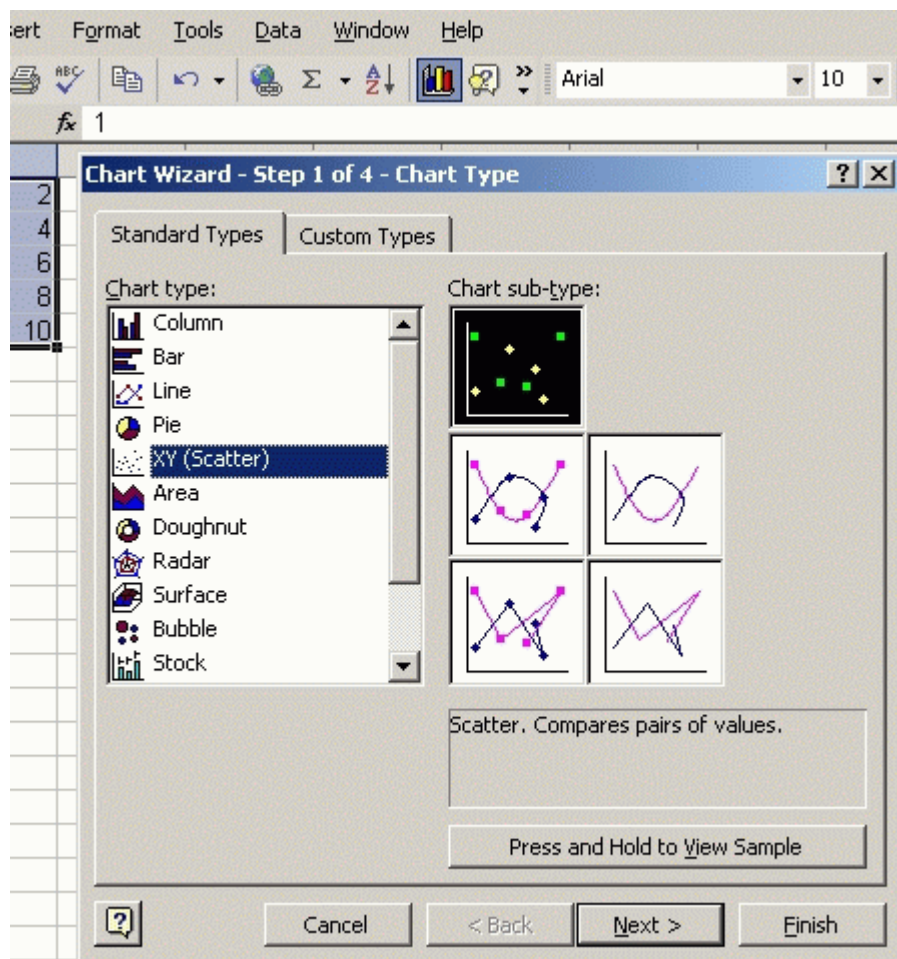
- Compare your results with each other and with the expected value (9.8 m/s^2).

How to obtain a linear fit line by Excel

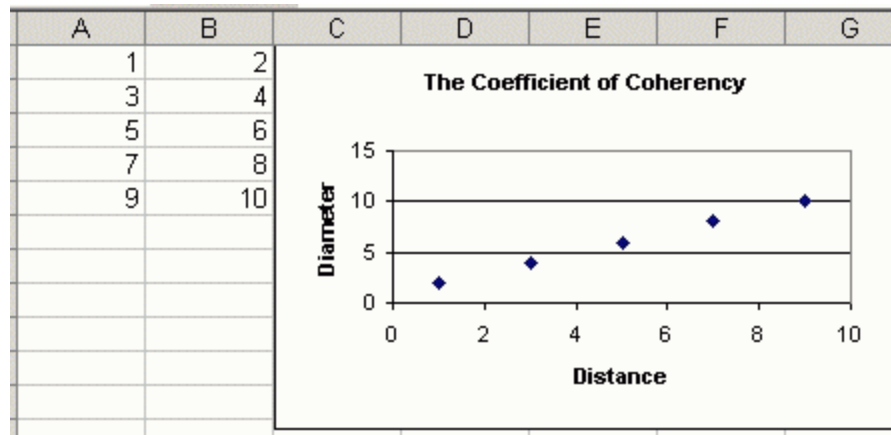
1. Type the obtained values for x- and y-axes. Columns A and B are x and y respectively. Then select only the numbers.



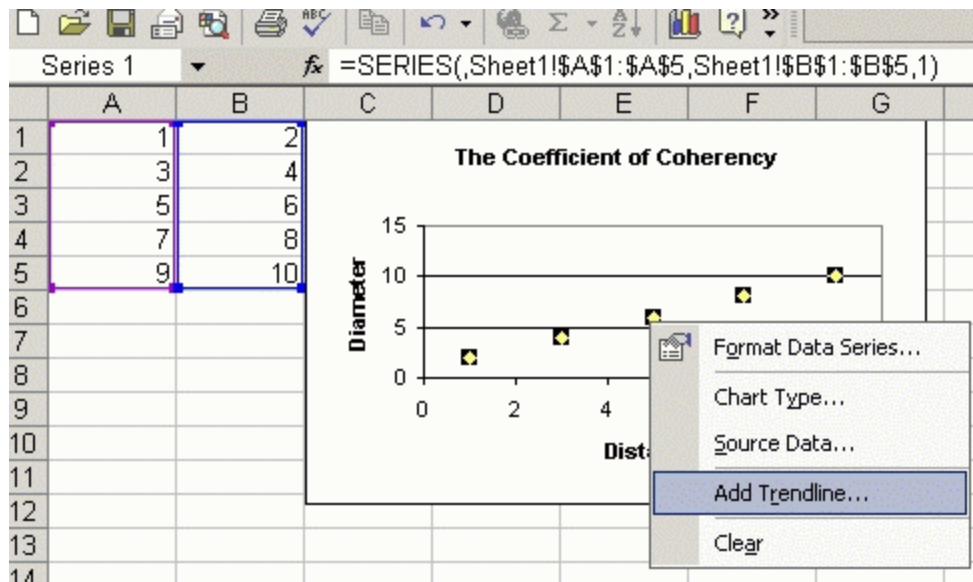
2. Click Chart Wizard from the tool bar. Select XY (Scatter) as follows.



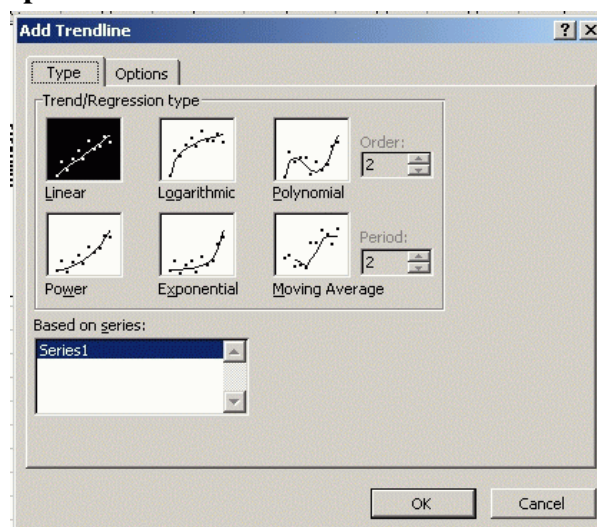
- With going through the Chart Wizard, name the graph title, x- and y-axes. After clicking “Finish”, you will have the following.



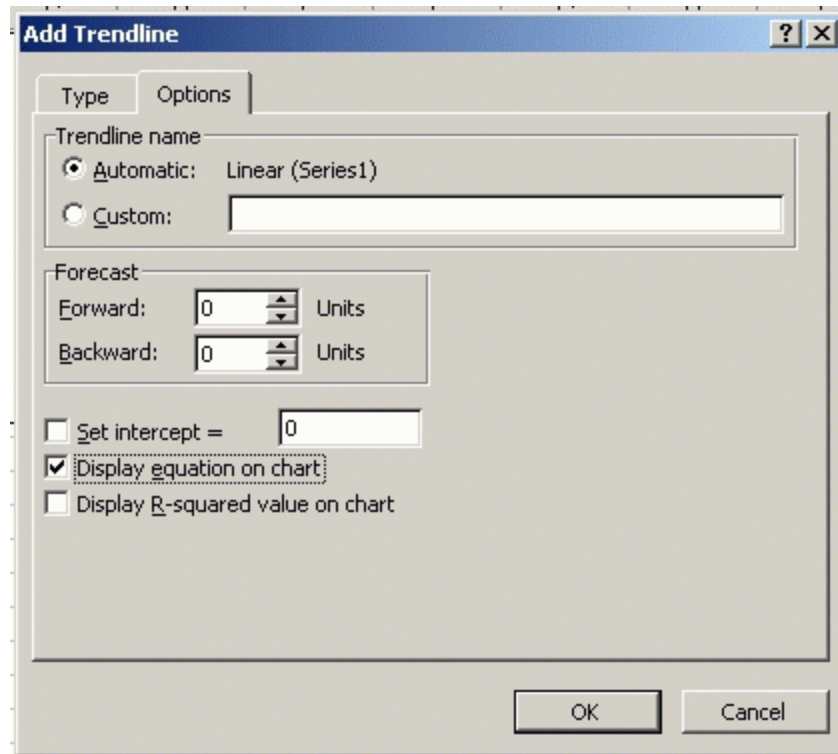
- Right click one of dots on the graph. Then select “Add Trendline.”



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



6. Check the box, "Display equation on chart." Then click "OK."



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

