

Graphical Analysis in Excel

EGN 1006 – Introduction
to Engineering



Creating Graphs

Creating graphs in Excel is a simple process

Follow these steps:

- Select the block of cells containing the data to be plotted. You may include headings!
- The “X” axis data column should always be to the left of the “Y” axis. **For example, place x-axis data in column A and y-axis data in column B.**
- Click on the ***INSERT*** tab
- Choose the graph type from the CHARTS area (In engineering and science, SCATTER is most often used).

More on Graphs

- Graphs done on a SEPARATE sheet can easily be copied or pasted into a WORD document.
- Graphs embedded into worksheet can be edited even after they have been inserted.

Creating and Editing a Line Graph

Suppose we had the following time and distance data for an object that is moving.

Prepare an Excel worksheet and a **SCATTER** plot with the data to the right. Be sure to place **TIME** in column A and **DISTANCE** in column B.

Time (sec)	Distance (m)
0	0.44
1	1.12
2	2.25
3	3.65
4	4.87
5	5.62
6	6.69
7	7.87
8	8.12
9	9.33
10	10.87

Fitting Equations to Data

The data an engineer collects could reveal:

- Spatial profile
- Time history
- Cause and effect relationship
- System output as a function of input

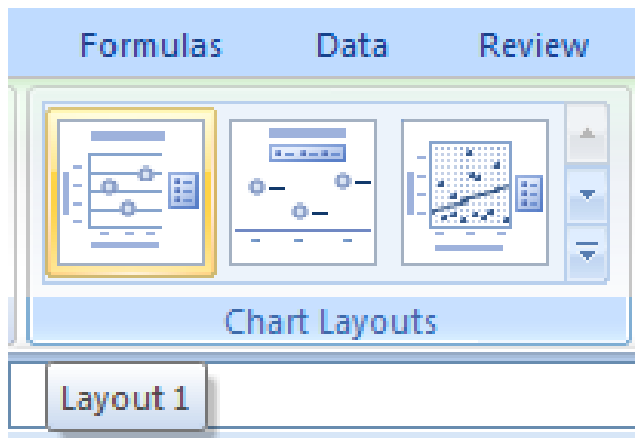
Mathematical expressions are then used to
CAPTURE the relationship shown in the data

Fitting a straight line to a set of data

Data is usually represented by values that show some **SCATTER**, which is due to fluctuations or errors in measurement.

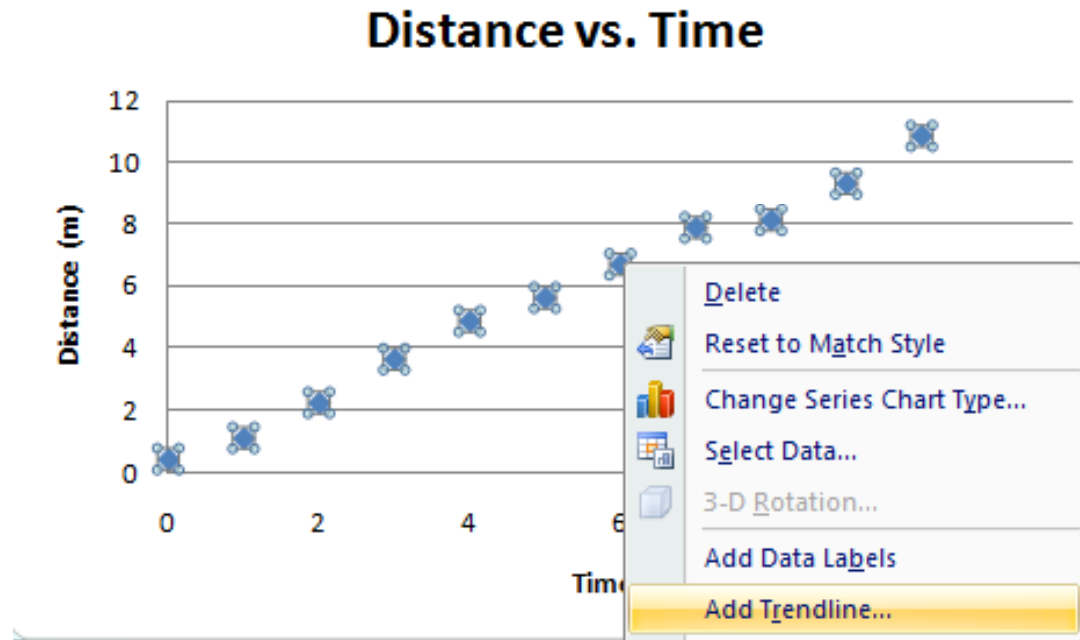
Therefore, we NEVER connect the dots on a graph! We pass the points through an **AGGREGATE** or **TRENDLINE**. In science, this is probably referred to as a “line of best fit”.

Adjusting the graph layout



Click on each axis title to add the appropriate variable and units. Also add an appropriate title. Use y vs. x as a guideline.

The line of best fit, a.k.a “The Trendline”



Right click on a data point, then select ADD TRENDLINE.

Which fit do I choose?

Inspect your data. It appears linear, so select linear for regression type. The check the last 2 boxes down at the bottom to display the equation of the line and the correlation value.

Trendline Options

Line Color
Line Style
Shadow

Trendline Options

Trend/Regression Type

Exponential
 Linear
 Logarithmic
 Polynomial Order: 2
 Power
 Moving Average Period: 2

Trendline Name

Automatic : Linear (Distance (m))
 Custom:

Forecast

Forward: 0.0 periods
Backward: 0.0 periods

Set Intercept = 0.0
 Display Equation on chart
 Display R-squared value on chart

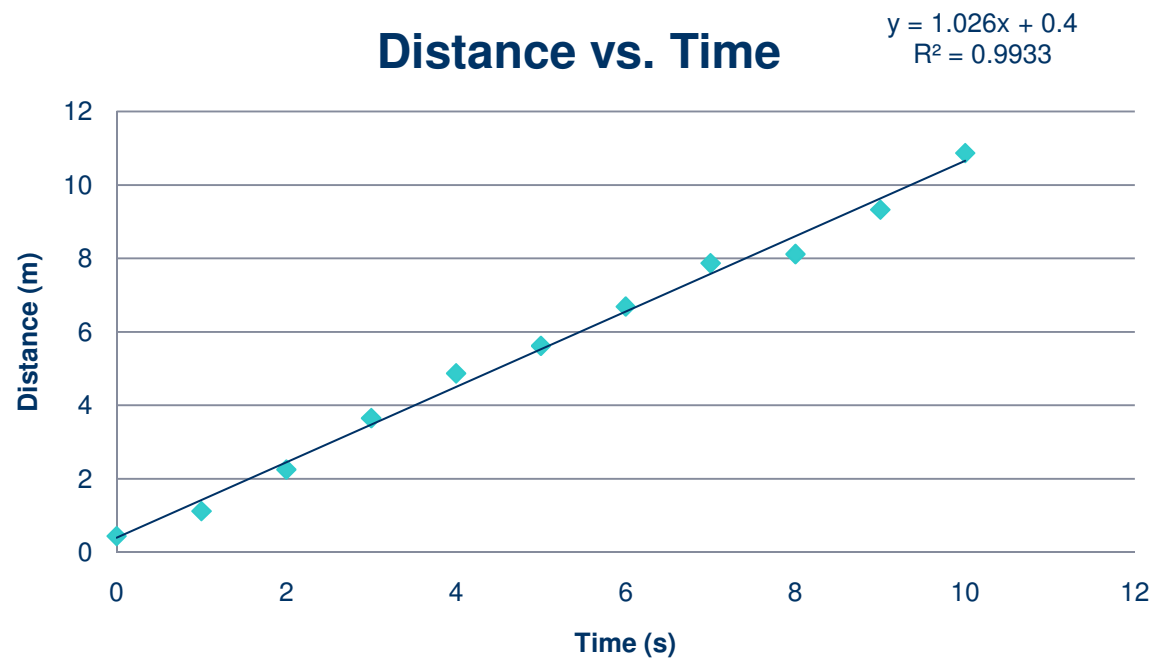
Assessing Quality using r^2

The r^2 value helps and engineer assess the QUALITY of the curve fit.

Any number close to 1.0 is a good fit. You can think of this value as a %fit. A 1.0 would represent 100%.

If the r^2 value is too low, right click on the trendline and change the type to LOGARITHMIC or other type of curve fit. The largest r^2 value is the one that fits the data the best.

Assessing Quality using r^2



As you can see, the equation is in the form of $y = mx + b$, where m (slope) = 1.026 and the y intercept is 0.4. Since the R^2 is close to 1, this is a good fit for this data set. **What does the slope and y -intercept tell us about this object?**

The “OTHER” fitting functions

- Exponential
- Logarithmic
- Power Function
- Polynomial (NOTE: By INCREASING the order, you can increase your r^2 value)