- **Y8 IT in Science – Using Forces**

IT in Science
Information Technology can be used in all subjects but is very useful for Science.
We can use Information Technology in Science to help us with all these things:
1. Creating reports (documents, web sites and posters).
2. Storing results from experiments.
3. Automatically recording results (data logging).
4. Creating graphs to display results.
5. Research.
In this module we will be doing some of these things.
In your GCSE science lessons in the future you will be using data logging equipment to automatically record results from an experiment onto a computer.
The main learning aim of this module is the correct use of spreadsheet charts and graphs:

Key chart points: Charts need a title and axis labels with units
                      Charts need to be the correct type
                      To get a best fit line on a scatter graph use a trendline

In this module you will:
- Do some exercises in Excel to improve your graph and science skills using real data some of it from experiments you may have done in year 7.
- Put together a science report on forces and materials using:
  - The experiment on stretching springs in the Using Forces module.
  - Information from your own research.

Things for you to do are in usually in green
Try to read everything – follow the hyperlinks if you have time. Use the chart wizard to create the graphs. On an existing chart either right click or use the chart menu to alter the graph.

**If you are using the resources in the college system copy this "85 Science Report" folder into the CT folder in your "My Documents".**
If you are using the student website the files can be downloaded from there. (click the enable editing after you open the file)

- *Part A - Creating Excel graphs*

A1 How to draw a column graph (a.k.a. bar chart) in Microsoft Excel

1. Find the **forcesizes.xls** file. **Open the file**.
   a. We are going to draw a graph of force sizes vs. force names.
   b. The different forces are going to be in different colours.
   c. We are going to put correct titles and labels on the graph.
2. **Select the data** that you want to draw a graph of (column A and column C). Do this by clicking and dragging down from cell A7 to A12. Then hold down the Ctrl key while you select cells C7 to C12.
3. Click on the **Insert** ribbon and choose **column, 2D column.**

4. Click inside the chart area, then using the **Chart tools, Layout** ribbon, **Axes Titles**, put a title of Force Exerted by for the horizontal axis and Force Size in Newtons for the vertical axis. You can change the font size by right clicking in the text box.
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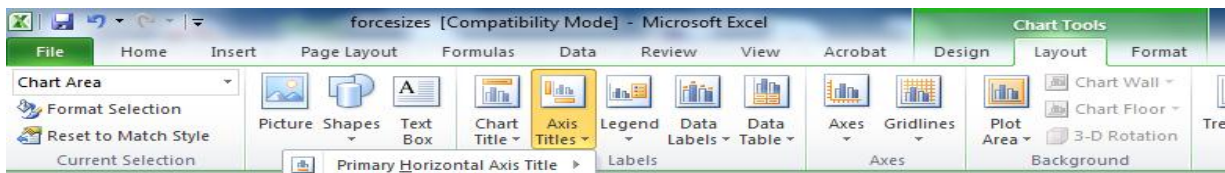
5. After ChartWizard has created the graph **resize and reposition** the box so it looks better on the page.

6. **Delete the "Series 1" legend** – it does not tell us anything.

7. Change the size of the labels on the horizontal axis - Left click the labels below the x-axis and format the font to size 8. Choose a suitable size for the vertical numbers. You can change the font size by right clicking in the text box.

8. To **change the colours of the individual data items** select it twice until the data point(bar) is highlighted individually then double click or right click. Choose Fill, Solid Fill to change each bar to a different colour.

9. Click in the outer Chart Area (not Plot Area), then use right mouse button to Move the chart – to a New sheet called ForceSizeChart. **Save the file** – this will save the spreadsheet with a new sheet with the column chart on it.

10. Go back to the Forcesizes data sheet – change the strength of 100 hairs to 300 Newtons – look how the chart has changed – put the data back to its original number of 100

11. Extension activity: **Research the size of another force and add this into your graph**.

A2 How to draw an x-y scatter graph (a.k.a. line graph) in Microsoft Excel

1. Find the **takeoffforces.xls**. **Open the file**.
2. We are going to draw a graph of force sizes vs. time.
3. The different forces are going to be in different colours.
4. We are going to put correct titles and labels on the graph.
5. **Select the data** that you want to draw a graph of……cells A3 to O6.
6. Click on the **Insert** then **Chart.**
7. Choose the **XY (Scatter) graph** line type.
8. Using the Chart tools ribbon fill in suitable **titles for the graph and axes**.
9. After you have created the graph **resize and reposition** the box so it looks better on the page.
10. **Select** the weight of rocket line on the graph and right click add a suitable **trend line**. Alternatively add a trendline by going to use chart tools layout, trendline.
11. **Move** the chart onto a new sheet by right clicking on the chart area, then **Save the file.**
12. Extension activity: Describe the relationship between time and weight of rocket and try to **explain the reason for it.**

A3 How to draw pie chart in Microsoft Excel

1. Find the **frictiononabike.xls** file. Open the file.
2. We are going to **draw two pie charts** to show how the importance of the different types of friction changes **at different speeds**. (i.e. one chart at 6m/s and the other at 12 m/s)
3. **Select the data** that you want to draw the first pie chart graph of…cells B3 to E4. Make a pie chart using this data. Note that row B is automatically used to label the data.
4. **Select the data** that you want to draw the second pie chart graph of …………. first cells B3 to E3, release the mouse button and then hold down the Ctrl key while you select cells B5 to E5. Make a pie chart using this data. **Draw a second pie chart.** Note that row B is automatically used to label the data.
5. Make sure that the bike speed is included in the title (Chart tools, Layout) for each graph so we know which chart is which. **Move** both pie charts onto one single new sheet and **Save the file.**
6. Is air resistance more important at fast or slow speeds? **Write the answer to this question as a complete sentence on your sheet.**

Putting my graphs into a word document report.

We will assess Part A of your work by looking at the word document you create:
Create a new word document called "Types of graph" in your folder. Into this document you will write some notes on types of graph (see below), copy and paste your three graphs, and write an explanation about what each graph shows.

- How do I know which type of graph I should draw?

To answer this question as yourself what type of data are the variables you want your graph to show?

Types of graph:
   - If both the variables are numbers use an X-Y scatter graph. For example a graph of heights of people against their age.
   - If one variable is a number and the other is a category use a bar or column chart. For example 100m times against name of person.
   - If you want to show what something is made up of use a pie chart. For example the ingredients of a cake.

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- ***Extra x-y scatter practice***

This is the most common graph to need to draw in Science. In science you also need to be able to describe what a graph shows.

   1. **Read the "describing relationships file"**

   2. **Try the extra X-Y scatter example.**

Part B - Changing Excel graphs

Once you have drawn you graph you will usually want to change it. Often the easiest way can be to delete it and start again but once the graph is almost what you want you will need to know how to make those last adjustments to make it perfect………..

1. Open **graphproblems.xls**.
2. **Use the instructions** at the bottom **each** of the worksheets to fix the problems on each of the worksheets.
3. If you are ahead of most of the class try to **answer the science questions on each worksheet**. Type in your answers on the worksheet. Do not worry if you cannot answer these, they are not part of the assessment.
4. Part B will be assessed by looking at this file so **Save the file after each improvement you make.**

- *Part C – More practice*

Assignment	.	Practice
gestationperiods	.	Easy graph; harder Maths based science task using months and years.
resistcurrent	.	Trend line; Describing relationships
energyfoods	.	Extracting the data for a graph into a mini table so graph is good; balancing a diet.
lawofreflection	.	Trend line; Describing relationships
bridgematerials	.	Easy graph; Interpreting information.

Part C will not be part of the main assessment but we may look at what you have done if your work is incomplete in other areas.

- *Part D   -   Science report on Stretching Springs experiment.*

You will need notes and results from the Using Forces unit of Spotlight Science 8 for your project so make a note in your planner to bring your science book or at least a copy of your Stretching Springs experiment results to your next few IT lessons.

1. Copy your results into a spreadsheet and create the perfect graph to show them.
2. Use the framework document springsreport to help write your report.

You will be assessed on the planning (see file Science report plan) and the contents of your springsreport. Make sure the graph(s) is (are) good!