**Science Skills**

**Line Graphs Level 4**

** World Production of Plastics**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Class: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Line Graphs**

In Science, results of an investigation usually have to be displayed as a graph.
A graph is a diagram that shows the relationship of one variable to another.

Graphs are used because they present information in a way that is easy to understand.
Scientists use graphs to avoid the need to write long, detailed descriptions of their results.

A **line graph** is used to display the relationship between two variables. Usually one of the variables is time. The variables in the graph below are **time** and **temperature**.
The line graph below **tracks** the temperature at various **times**.

**Layout**

A **line graph** looks like this:

The scale on the Y axis **starts at 0** at the bottom and goes up **evenly** (in tens in this graph).

The graph should be big enough to be clear. Make it just a little smaller than the graph paper you are given.

The data you have **found out** in the investigation, (in this graph the **temperature**) goes on the Y axis.

The values are plotted using a small x or a dot, and the dots are joined together with a line.

The graph **must** have a title.

The Y axis **must** have a title with **units**.

**Y** axis

**X** axis

The **thing you know or control in the investigation** always goes along the **X axis**. In this case it is the **time**.

The values (numbers) along the X axis are evenly spaced.

The X axis **must** have a title with **units**.

**How to Draw a Line Graph**

|  |
| --- |
| **Results of investigation into the temperature of water over a period of time** |
| Time in minutes | Start | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Temperature increase in degrees C | 20 | 40 | 60 | 70 | 80 | 85 | 90 | 95 |

1. Decide on a **Title** for the graph by combining the headings in the table.
The aspect should be mentioned first in the title.
***“Time Taken for Water to Heat”***

2. Decide what is being compared. In a line graph the **thing you know or control**, in this case the **time**, always goes in the X axis (along the bottom).

There are 8 entries in the table. You will need **eight** lines.
These have to be evenly spaced. Start at the first heavy line from the left.

 Start 1 2 3 4 5 6 7

3. Write in the values (number of the minutes) under the lines.

4. Now look at the numbers in the other set of data, **what you have** **found out** in the investigation. Look at the lowest and the highest numbers to decide on the **scale**.
Decide what they should “go up in” in the Y axis.
At Level 4 the scale is always a little less obvious than at Level 3. It could go up in 2s, 5s, 10s or 20s. Or it might have decimal points. Remember, it should always start at 0.
In the example below it “goes up in” 1s with decimals evenly spaced between.

 2

 1.6

 1

 0.4

 0

 Start 1 2 3 4 5 6 7

5. Fill in the rest of the scale on the Y axis. Make sure it goes up evenly spaced.

6. Look back at the data in the table. Draw the dots or Xs to the correct height according to the scale. Join the dots with a line. (Use a ruler)

7. Label the X axis and the Y Axis. Remember the **units** in the labels.

**How to Make a Line Graph using Microsoft Word**

|  |  |
| --- | --- |
| ***Distance of light meter from torch (cm)*** | ***Light Level (Units)*** |
| 20 | 27 |
| 40 | 8 |
| 60 | 5 |
| 80 | 3 |
| 100 | 2 |

1. You should have the data ready in a table.
2. Click the **Insert** menu button and then **Chart**.
3. Choose a chart type from the **Column** option.
(The first is the standard line graph used here)
Click the button and then OK.
4. A spreadsheet document will open up.
Where it says **Category 1** in the spreadsheet, type in the first item in the **X axis**. Here it is *20*.
In category 2 type in *40*.
Do this until you have filled in all the categories in the X axis.
5. Now look at the **Series 1** list in the spreadsheet.
Fill in the corresponding data from the table. Here *20* corresponds with *27* in the Series 1 list. Fill in all the data. This will go into the **Y axis**.
6. Drag the **blue box** in the spreadsheet around only the data in the spreadsheet you need for your chart. This will be around the Categories and Series 1 data.
7. The chart will appear automatically in your document, with the scale and line.
Close down the spreadsheet document.
8. Click the chart. The **Chart Tools** button appears. Click the Format menu and Text Wrapping, square, to move the chart around.
9. “Series 1” in the chart and the Chart Title are both in text boxes. Click on the title and change it. Delete the other text box at the side.
10. Insert the **titles** of the axis by clicking on the chart and selecting Chart Tools, Layout, Axes Titles.
For the X Axis click Primary Horizontal Axis Title, Title below Axis. Type the title in the text box in the chart.
For the Y Axis, click Primary Vertical Axis, Rotated Title and type the title in the text box in the chart.
11. To fill in the exact data, click Chart Tools, Layout, Data Labels, Center and the exact data will appear in the bars.

1.

Show this information as a line graph:
Remember: You controlled the data ‘Woman’s age’, so this goes along the X axis.
 Be careful to place the numbers in the correct position on the scale given.
Y Axis Scale: The lowest number in the data you have found out (*Risk of Down’s
 Syndrome*) is 4. The highest is 100.
 So the scale should start at 0 at the bottom and go up in 10s.

 **Influence of the Woman’s Age in the Occurrence of Down’s Syndrome**



2. An experiment was set up to investigate the effect of temperature on the growth of
 bacteria. The results are in the table below.



Show this information as a line graph:
Remember: You controlled the data ‘Temperature’, so this goes along the X axis.
 Be careful to place the numbers in the correct position on the scale given.
Y Axis Scale: The lowest number in the data you have found out (*Bacteria)* is 170. The
 highest is 430.
 So the scale should start at 0 at the bottom and go up in 50s.

 **Effect of Temperature on the Growth of Bacteria**



3. An investigation was conducted to fine out the increase in temperature as peas
 germinate. The results are shown in the table.

Show this information as a line graph:
Remember: You controlled the data ‘Time’, so this goes along the **X axis**.
 Be careful to place the numbers in the correct position on the scale given.
Y Axis Scale: The lowest number in the data you have found out (*Rise in Temperature)* is 0.0. The highest is 5.6.
 So the scale should start at 0 at the bottom and go up in **1s** with the
 decimal points spaced evenly between. (0.2; 0.4; 0.6 etc)

 **Effect of Temperature on the Growth of Bacteria**



4. An experiment was set up to find out the effects of pH on starch being converted to maltose, over a period of 20 minutes.

 The results are shown in the table.

Show this information as a line graph.

 **Effects of pH on the Conversion of Starch to Maltose over 20 Minutes**



5. The table shows the production of alcohol for use as an alternative fuel from 1998 to 2008.

 Show this information as a line graph.

Remember:
The line graph should be big enough to fill most of the graph paper, not a tiny graph in a corner.

 Note:
 Each small box represents 500.

 **Production of Alcohol for Use as Fuel 1998 – 2008**



6. The table below shows the results of an investigation on the time taken for a biological washing powder to completely remove an egg stain from a shirt at different water temperatures.



 Show this information as a line graph.

 Remember: You knew about the water temperature. This was what was controlled in
 the investigation. This goes on the X axis (along the bottom).
 Scale: The lowest number is 9. The highest is 34.
 The scale should start at 0 at the bottom and go up in 5s.

 Time Taken to Remove Egg Stain at Different Water Temperatures



7.

Show Scott’s results as a line graph.

 Deflection Caused by Different Mass



8. An experiment was set up to investigate how the light level changes as
 you move further away from a torch. The results are in the table below.

|  |  |
| --- | --- |
| ***Distance of light meter from torch (cm)*** | ***Light Level (Units)*** |
| 20 | 27 |
| 40 | 8 |
| 60 | 5 |
| 80 | 3 |
| 100 | 2 |

Use these results to show a line graph.
Remember to make the line graph the size of the graph paper.

 **Change in Light Level at Various Distances**



 **0**

 **0**