Mathematical modelling.

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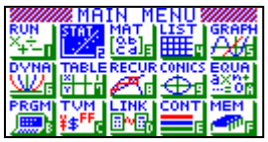
Select STAT mode from the main menu by using the arrow keys to highlight the STAT icon or pressing 2.

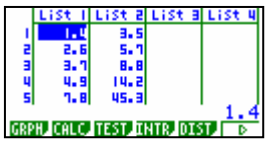


Example: The following measurements were found and there is thought that there is a relationship of the form $y = ae^{bx}$

X	1.4	2.6	3.7	4.9	7.8
Y	3.5	5.7	8.8	14.2	45.3

Find the equation of the relationship.

Answer: Enter the data into List 1 (X) and list 2 (Y), as shown here.



Mathematical theory: $y = ae^{bx}$

$\ln y = \ln (ae^{bx})$

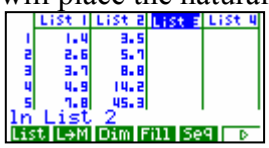
$\ln y = \ln (a) + \ln (e^{bx})$

$\ln y = \ln (a) + bx \ln (e)$

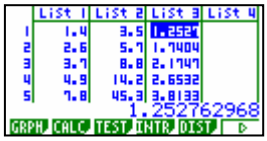
$\ln y = \ln (a) + bx$

which is 'like' a straight line equation $y = mx + c$

Move the 'cursor' so that it is placed on top of **List 3**, press **ln**, then **OPTN** then **F1** (for LIST) and **F1** again for **list,** then **2** , as shown below, then **EXE** This will place the natural logarithm values of Y into the List 3 column.



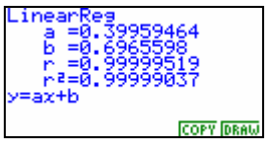
EXIT twice to get this 'window'

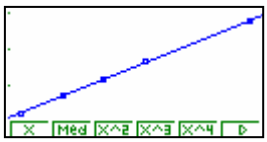


Press **F1** for **GRPH**, then **F6** for **SET** to set up the calculator for a Scattergraph,

then **EXIT** and **F1** for the graph.

To find the linear model, press **F1** and record the values of a and b shown, then **F6** to see the log - linear relationship





Relating this back to the theory: $\ln y = \ln(a) + bx$

$\ln(a) = 0.6965598$, so $a = 2.006836898$ and $b = 0.39959464$

Hence the required equation is:

$$y = 2.007e^{0.399x} \text{ (3dp accuracy)}$$

X	1.4	2.6	3.7	4.9	7.8
Y	3.5	5.7	8.8	14.2	45.3
Modelled Y values	See List 4 results