

Transforming Data on the Classpad

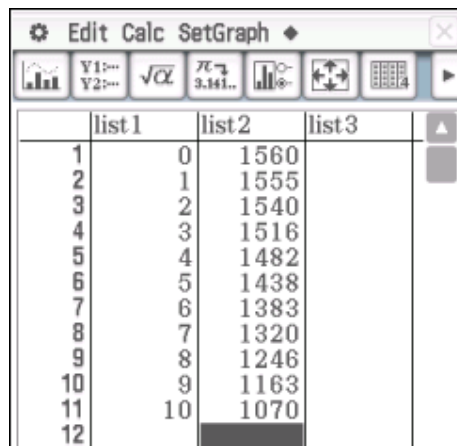
The table shows the height (in m) of a base jumper for the first 10 seconds of her jump.

Time	0	1	2	3	4	5	6	7	8	9	10
Height	1560	1555	1540	1516	1482	1438	1383	1320	1246	1163	1070

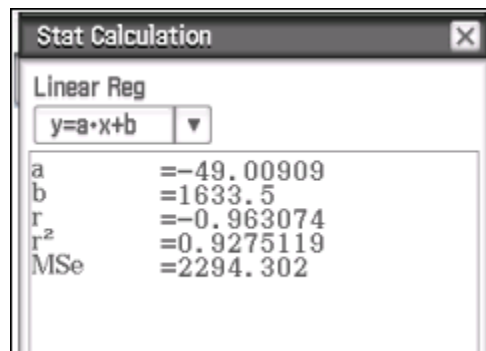
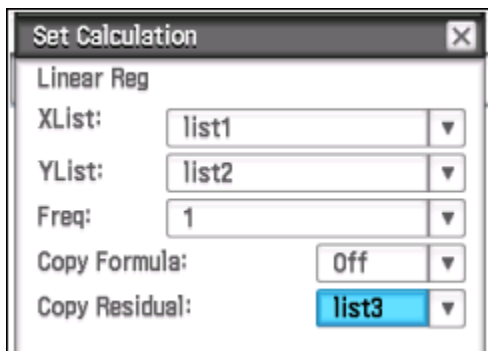
- Construct a scatterplot displaying *height* (the RV) against *time* (the EV).
- Linearise the scatterplot and fit a least squares line to the transformed data.
- Use the regression line to predict the height of the base jumper after 3.4 seconds.

The Explanatory Variable (EV) - Time goes in **list1**

The Response Variable (RV) – Height goes in **list2**

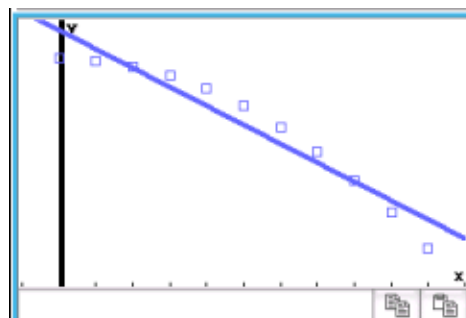


	list1	list2	list3
1	0	1560	
2	1	1555	
3	2	1540	
4	3	1516	
5	4	1482	
6	5	1438	
7	6	1383	
8	7	1320	
9	8	1246	
10	9	1163	
11	10	1070	
12			



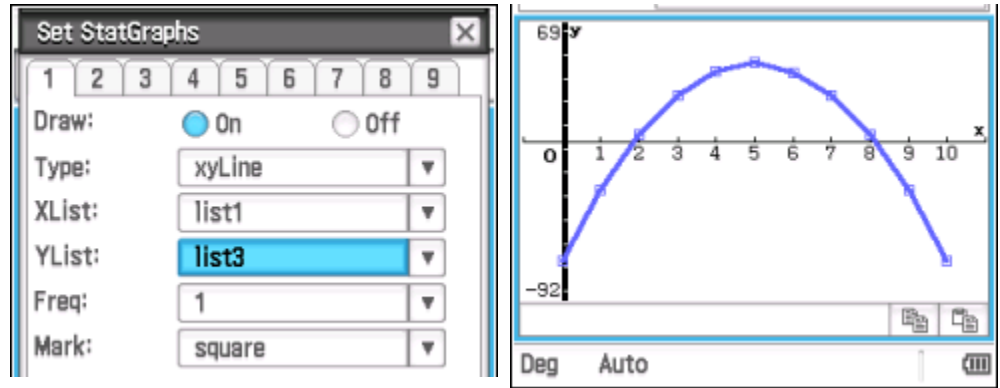
Now find the least squares line.
Calc – Regression – Linear Reg copy the residuals into **list3**.

The plot indicates the data may be non-linear.

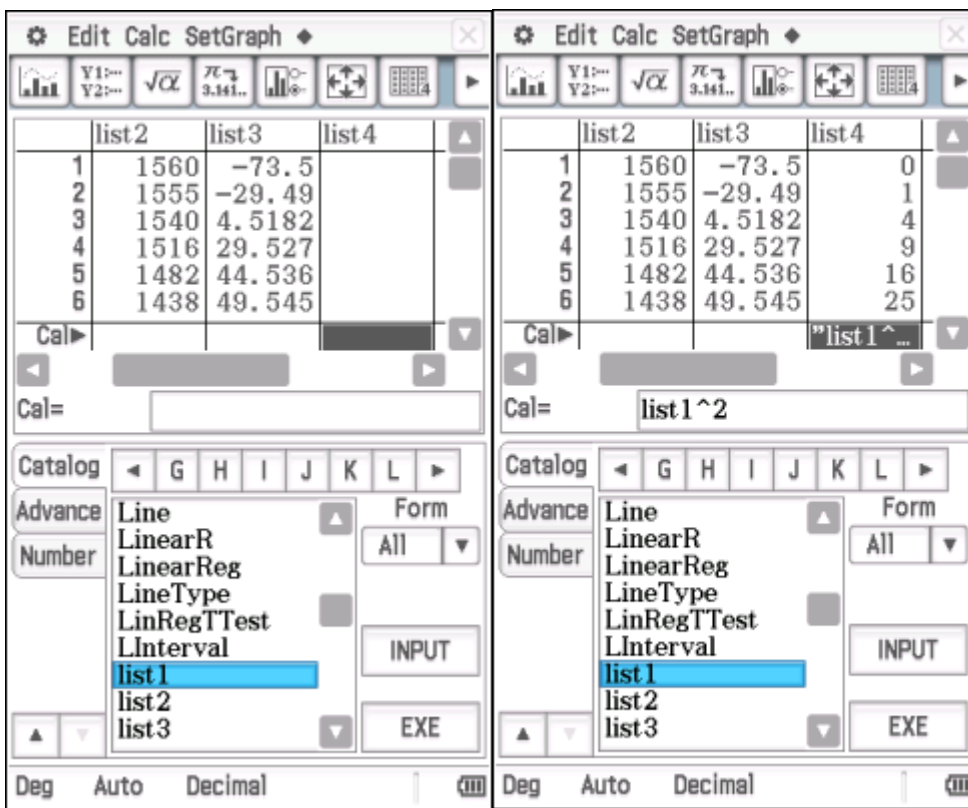


Construct a residual plot

The residual plot has a clear pattern, indicating a probable non-linear association.



Comparing the shape of the original plot with the Circle of Transformations. We see that x^2 and y^2 are possible transformations. Let's try x^2 first.



On the list screen.

Place your cursor in the Cal line at the bottom of **list4**.

Go to Keyboard – Catalog – L – and scroll to find list1.

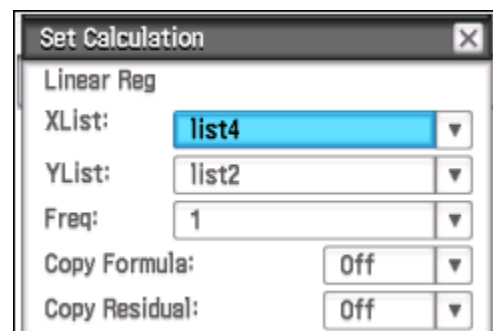
Tap on **list1**

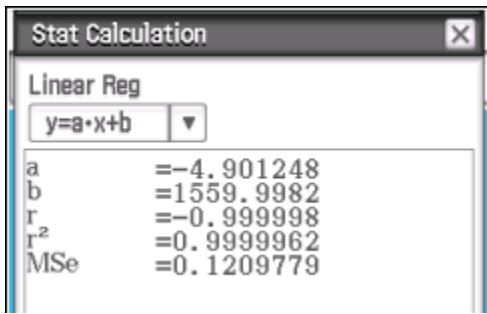
List1 will appear in the Cal= box, Type ^2 and tap EXE

Now find the least squares line of the transformed data.

Calc – Regression – Linear Reg

Change the Xlist to **list4**.





Tap OK

The equation of the regression line is $y = -4.901 x^2 + 1560$

Note: x^2 in the equation because we have done an x^2 transformation

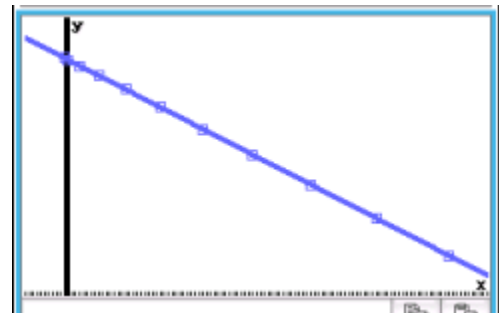
We must write the equation using the variables in the question.

Time (EV) and Height (RV)

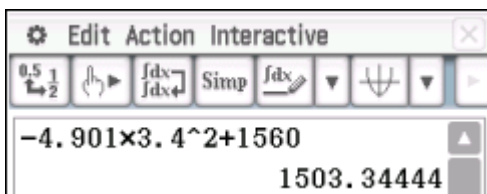
Also round to 4 significant figures as the height has 4 figures

$$\text{Height} = -4.901 \times \text{Time}^2 + 1560$$

A plot of list 2 and list4 indicates a good fit for the transformed data.



We can now use our regression line to make predictions.



At 3.4 seconds, the height is 1503 metres.