

Displaying data – Log scale



Student Activity

7 8 9 10 11 12



TI-Nspire



Investigation



Student



30 min

Introduction

Logarithmic scales are often used in charts and graphs. In some datasets a few points may be much larger than the rest; such data sets are said to be skewed towards the large values (positively skewed). Skewed graphs are more easily interpreted when converted to a more symmetrical distribution using a log scale.

A common base for logarithmic scales is the base 10 and is useful when the data range occurs over several orders of magnitude.

A dataset where this manipulation is required involves looking at weights of animals ranging from small insects, such as mosquitoes, through to large mammals such as whales.

Example

The adult weight of 27 animals (in kg) is as follows:

11	3.4	532	209	61	6650	9300	6.8	34
0.12	0.042	2.6	55	100	52	136000	0.13	187
1.6	500	35	27	1.0	25800	2580	190	521

Task 1.

- Display the data as a histogram. Enter the data in a **Lists & Spreadsheet** page and plot in a **Data & Statistics** page.
- Describe the shape of the distribution.

Task 2.

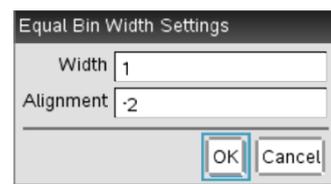
- Use a column formula to convert the weight values to log values. Refer to example screen opposite.
The log command can be accessed using `ctrl` `10x`.

The screenshot shows a TI-Nspire calculator interface with a spreadsheet. The spreadsheet has columns labeled 'data' and 'logdata'. The formula bar shows the formula `logdata = log (data)` with a base of 10. The data values are 0.2, 200., and 2000., and their corresponding log values are -0.69897, 2.30103, and 3.30103.

	A data	B logdata	C	D
=		=log(data)		
1	0.2	-0.69897		
2	200.	2.30103		
3	2000.	3.30103		
4				
5				

logdata = log₁₀ (data)

- b. Display the transformed data as a histogram with Bin Setting Width of 1 and Alignment of -2 (**menu**>**Plot Properties**>**Histogram Properties**>**Bin Settings**>**Equal Bin Width**).
Change the y-scale to Percent using (**menu**>**Plot Properties**>**Histogram Properties**>**Histogram Scale**>**Percent**)



- c. Describe the shape and distribution of the histogram.
- d. What percentage of animals in the dataset had weights between 10 and 100 kg? Scroll across the histogram to show column details.

Hint: $\log 10 = 1$, $\log 100 = 2$

- e. Compare the number of animals weighing between 100 kg and 1000 kg with the number weighing between 10 and 100 kg.

Task 3.

- a. Discuss why using the histogram with the log transformation was better than the original histogram in answering parts 2(d) and 2(e) above.