The logarithm function

Introduction

This leaflet provides a table of values and graph of the logarithm function $y = \log_e x$.

1. The logarithm function and its graph

Logarithms have been explained on leaflet *2.19 What is a logarithm ?*. There we showed how logarithms provide alternative ways of writing expressions involving powers, and we showed how a calculator can be used to find logarithms.

The **natural logarithm function** is $y = \log_e x$, also written $\ln x$.
Note that we have chosen to use logarithms to base e as this is the most common base.

Using a calculator it is possible to construct a table of values of $y = \log_e x$ as follows:

x	0.5	1	1.5	2	2.5	3	3.5
$y = \log_e x$	-0.693	0	0.405	0.693	0.916	1.099	1.253

You should check these values for yourself to make sure that you can obtain them.

If pairs of x and y values are plotted we obtain a **graph** of the logarithm function as shown.
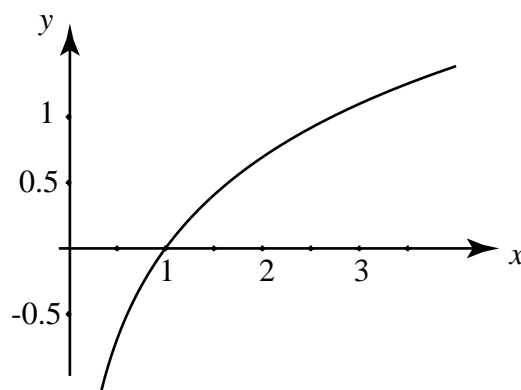
The graph of the natural logarithm $y = \log_e x$

Note that the logarithm function is only defined for positive values of x. We cannot find the logarithm of 0, or the logarithm of a negative number.

As an exercise you should draw up a similar table for the function $y = \log_{10} x$ and plot its graph. The graph should have the same general shape as the one above although most of the points on the graph are different.