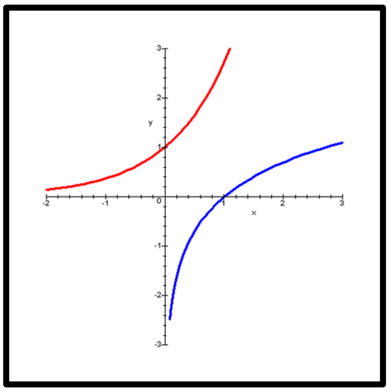
**Module: BIOM – 1007** **Lecturer: Dr Weldon** **Date: 14/11/16**

# Logs

- A logarithm is a quantity representing the power to which a fixed number (the base) must be raised to produce a given number
  - The common base is 10 but any number can be used as the base
    - The common base is written as log(x)
      - E.g. log (100) = 2
    - Any other number is written as $\log_n(x)$
      - E.g. $\log_2(8) = 3$



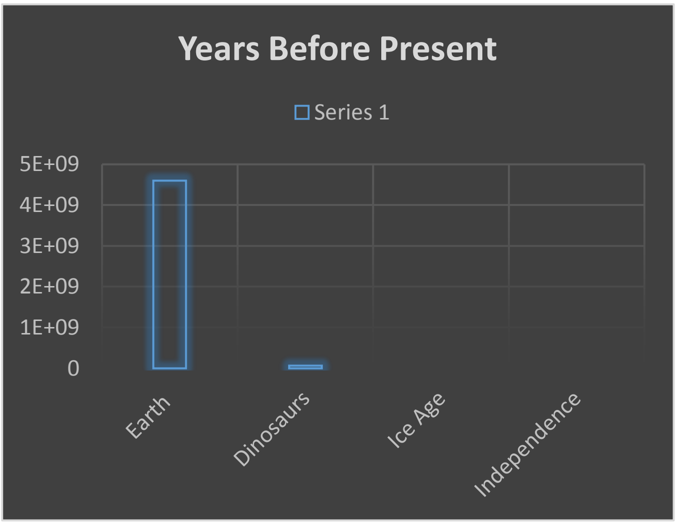

- A logarithmic graph is the opposite of an exponential graph (see right)
  - They both are asymptotes; the logarithmic graph is to the y axis whereas the exponential graph is to the x axis

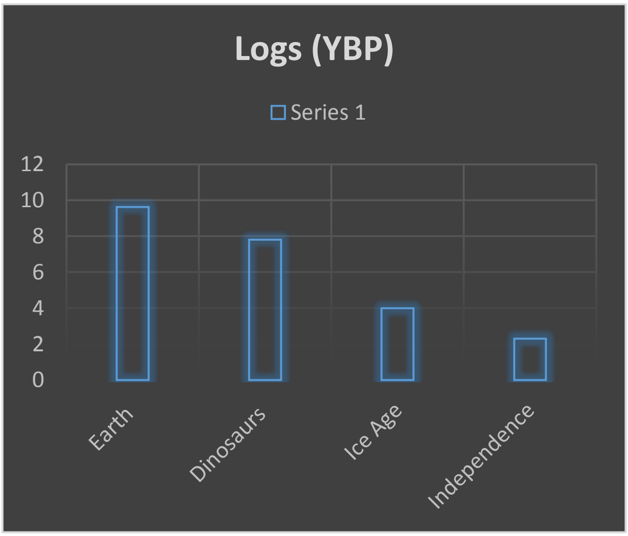
- All numbers lower than one have negative logarithms
  - E.g. log(0.0001) = -4
  - As they get smaller, the logs approach infinity

- The logarithm is not defined for negative numbers or 1
  - E.g. $\log_{-4}(5)$ and log(-87) won't work

- Logs are defined for all positive numbers and so doesn't have to be whole
  - E.g. log(500) = 2.699

- Logs are used in scientific applications to compare numbers of great various magnitude
  - For example, time scales vary from billions of years to fractions of seconds
  - Here is an example of times that can be compared:
    - Formation of earth – $4.6x10^9$ YBP
    - Dinosaur extinction – $6.5x10^7$ YBP
    - Last great ice age – $1x10^4$ YBP
    - Declaration of independence – $2x10^2$ YBP:
  - And here they are as their logs (YBP)
    - Formation of earth – 9.633
    - Dinosaur extinction – 7.813
    - Last great ice age – 4.000
    - Declaration of independence – 2.301
  - Note the difference in the ability to see the graphs:




Preview from Notesale.co.uk Page 1 of 2