

EXPONENTIAL FUNCTIONS AND LOGARITHMS

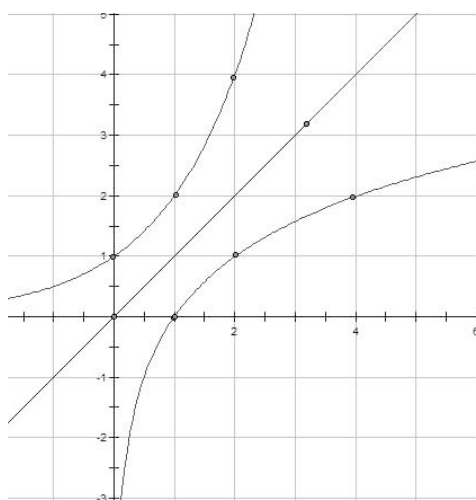
STUDENT RESOURCE

Functions of the form $f(x) = a^x$ are called exponential functions. You are going to explore graphs of $y = a^x$ for different values of a .

- Draw the graph of $y = 2^x$.
How is the graph of $y = a^x$ different from $y = 2^x$ for bigger integer values of a ?
What happens when $a = 1$? What happens for other values of a ?
- Now explore functions of the form a^{-x} in the same way.
- Now consider the function 2^{x+3} .
What is the connection between this function and the function 2^x ?
How do the graphs of $y = 2^{x+3}$ and $y = 2^x$ relate to one another?
- Explore other simple exponential functions.

- Draw graphs of $y = 10^x$ and $y = \log_{10} x$ on the same axes.
Describe what you see.

- Draw the graph of $y = 2^x$ and $y = k \log_{10} x$ on the same axes, putting $k = 1$ initially.
Using trial and improvement, find the value of k you need so that the combined image is symmetrical about the line $y = x$.



Challenge

Draw the graph of $y = a^x$ and $y = k \log_{10} x$ for other values of a , putting $k = 1$ initially.

Using trial and improvement, find the value of k you need, so that for different values of a the combined image is symmetrical about the line $y = x$. Tabulate values of k against a until you have a conjecture about how to predict the value of k from the value of a .