Logarithms

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## What is the logarithm function?

How would you solve to get a value for ?

Perhaps you have seen this calculation before, and so you know that the answer is . Often, however, we are asked to solve functions that have less obvious solutions, such as finding when .

We could go through each power of 2 until we find the correct answer, but this is very time consuming, and in a lot of cases or will not be integers.

This is why we have a logarithm function.

In order to calculate c when , we use logs:

.

So, in our earlier examples, we have that , and .

## Calculating logs

We read the function as ‘log base a of b equals c’.

On a scientific or graphical calculator, there will often be three buttons to allow you to calculate logs. There is usually a log10 button, a logx button, and a natural log button called (more on this later).

In order to calculate a log, you can use a calculator, or simplify it using log laws.

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## Natural logs

The natural log function is the inverse of the exponential function. If we were to calculate when , we would use our log function and calculate .

This function, ‘log base e’ is called the natural log function, and we write it as ln. So, we would calculate .

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## Log laws

There are several rules that the logarithm function follows. It is worth learning these as you will likely be required to use them often.

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Examples

1. Simplify .
2. Calculate .
3. Calculate .

Answers

1. .

Alternatively,

1. .

Alternatively, .

Alternatively,

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