Factsheet: Laws of logarithms

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Summary

A list of laws of logarithms.

*The associated study guide for this factsheet is* [*Guide: Introduction to logarithms*](../studyguides/logarithms.qmd)*. If you would like to know more about logarithms, please read the guide.*

Throughout this factsheet, $a,k,x,$ and $y$ are positive real numbers, and $n$ is a real number, with $a,k\ne 1$.

## Laws of logarithms

**Law 1 - Product Rule**:

$$log\_{a}\left(x\right)+log\_{a}\left(y\right)=log\_{a}\left(xy\right)$$

**Law 2 - Quotient Rule**:

$$log\_{a}\left(x\right)−log\_{a}\left(y\right)=log\_{a}\left(\frac{x}{y}\right)$$

**Law 3 - Power Rule**:

$$log\_{a}\left(x^{n}\right)=nlog\_{a}\left(x\right)$$

**Law 4 - Zero Rule**:

$$log\_{a}\left(1\right)=0$$

**Law 5 - Identity Rule**:

$$log\_{a}\left(a\right)=1$$

**Law 6 - Change of Base Rule**:

$$log\_{a}\left(x\right)=\frac{log\_{k}\left(x\right)}{log\_{k}\left(a\right)}$$

[For more on the subject, please go to Guide: Introduction to logarithms](../studyguides/logarithms.qmd)

## Version history

v1.0: created in 02/25 by Millie Pike as part of a University of St Andrews VIP project.

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