

# Questions: Logarithms

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## Summary

A selection of questions for the study guide on logarithms.

*Before attempting these questions, it is highly recommended that you read [Guide: Introduction to Logarithms](#).*

## Q1

For the following, find the value of  $x$ , representing your answer exactly (not decimals).

1.1.  $\log_7(x) = 1$

1.2.  $\log_8(x) = 3$

1.3.  $\log_{12}(x) = 0$

1.4.  $\log_{10}(100) = x$

1.5.  $\log_2(64) = x$

1.6.  $\log_4(2) = x$

1.7.  $\log_3(27) = x$

1.8.  $\log_{10}(1) = x$

1.9.  $\log_x(16) = 4$

1.10.  $\log_x(49) = 2$

1.11.  $\log_x(13) = 4$

1.12.  $\log_{2x}(12) = -1$

## Q2

Before attempting this question, write out the five laws of logarithms next to their names: the product rule, the quotient rule, the power rule, the zero rule, the identity rule.

Using the five laws of logarithms, find the value of  $x$ :

2.1.  $\log_3\left(\frac{1}{27}\right) = x$

2.2.  $4\log_4(2) = x$

- 2.3.  $\log_5(10) + \log_5\left(\frac{5}{2}\right) = x$
- 2.4.  $3\log_7(a^{1/3}) - \frac{1}{2}\log_7(a^2) = x$
- 2.5.  $\log_x(YZ) = M$
- 2.6.  $\log_a(y) - \log_a(x) = 11$

### Q3

Using the change of base rule and other laws of logs if required, express the following logarithms as expressions involving a logarithm to the specified base. Give your answer as simply as possible, evaluating if you can.

- 3.1.  $\log_3(25)$  to base 5
- 3.2.  $\log_8(3)$  to base 16
- 3.3.  $\log_e(10)$  to base 1000
- 3.4.  $\ln(27)$  to base 3
- 3.5.  $\log_4(8x)$  to base 2

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[After attempting the questions above, please click this link to find the answers.](#)

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### Version history and licensing

v1.0: initial version created 08/23 by Zoë Gemmell as part of a University of St Andrews STEP project.

- v1.1: edited 05/24 by tdhc.

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