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*](../studyguides/logarithms.qmd)*.*

## Q1

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

1.1. $ log\_{7}\left(x\right)=1$

1.2. $ log\_{8}\left(x\right)=3$

1.3. $ log\_{12}\left(x\right)=0$

1.4. $ log\_{10}\left(100\right)=x$

1.5. $ log\_{2}\left(64\right)=x$

1.6. $ log\_{4}\left(2\right)=x$

1.7. $ log\_{3}\left(27\right)=x$

1.8. $ log\_{10}\left(1\right)=x$

1.9. $ log\_{x}\left(16\right)=4$

1.10. $ log\_{x}\left(49\right)=2$

1.11. $ log\_{x}\left(13\right)=4$

1.12. $ log\_{2x}\left(12\right)=−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. $ 4log\_{4}\left(2\right)=x$

2.3. $ log\_{5}\left(10\right)+log\_{5}\left(\frac{5}{2}\right)=x$

2.4. $ 3log\_{7}\left(a^{1/3}\right)−\frac{1}{2}log\_{7}\left(a^{2}\right)=x$

2.5. $ log\_{x}\left(YZ\right)=M$

2.6. $ log\_{a}\left(y\right)−log\_{a}\left(x\right)=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}\left(25\right)$ to base $5$

3.2. $ log\_{8}\left(3\right)$ to base $16$

3.3. $ log\_{e}\left(10\right)$ to base $1000$

3.4. $ ln\left(27\right)$ to base $3$

3.5. $ log\_{4}\left(8x\right)$ to base $2$

[After attempting the questions above, please click this link to find the answers.](../answers/as-logarithms.qmd)

## 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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