

3-3 Properties of Logarithms

Express each logarithm in terms of $\ln 2$ and $\ln 5$.

4. $\ln 12.5$

ANSWER:

$$2 \ln 5 - \ln 2$$

8. $\ln 1.6$

ANSWER:

$$3 \ln 2 - \ln 5$$

Express each logarithm in terms of $\ln 3$ and $\ln 7$.

12. $\ln 147$

ANSWER:

$$\ln 3 + 2 \ln 7$$

16. $\ln 1701$

ANSWER:

$$5 \ln 3 + \ln 7$$

Evaluate each logarithm.

20. $8 \ln e^2 - \ln e^{12}$

ANSWER:

$$4$$

24. $3 \log_7 \sqrt[6]{49}$

ANSWER:

$$1$$

28. $36 \ln e^{0.5} - 4 \ln e^5$

ANSWER:

$$-2$$

Expand each expression.

32. $\ln \frac{4df^5}{\sqrt[8]{1-3d}}$

ANSWER:

$$\ln 4 + \ln d + 5 \ln f - \frac{1}{8} \ln(1-3d)$$

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36. $\log_5 a^6 b^{-3} c^4$

ANSWER:

$$6 \log_5 a - 3 \log_5 b + 4 \log_5 c$$

Condense each expression.

40. $5 \log_7 (2x) - \frac{1}{3} \log_7 (5x+1)$

ANSWER:

$$\log_7 \frac{32x^5}{\sqrt[3]{5x+1}} \text{ or } \log_7 \frac{32x^5 \sqrt[3]{(5x+1)^2}}{5x+1}$$

44. $\ln 13 + 7 \ln a - 11 \ln b + \ln c$

ANSWER:

$$\ln 13a^7 b^{-11} c$$

48. $\log_3 4 - \frac{1}{2} \log_3 (6x-5)$

ANSWER:

$$\log_3 \frac{4}{\sqrt{6x-5}} \text{ or } \log_3 \frac{4\sqrt{6x-5}}{6x-5}$$

Evaluate each logarithm.

52. $\log_{128} 2$

ANSWER:

$$0.143$$

56. $\log_{\frac{1}{3}} \frac{1}{3}$

ANSWER:

$$1.585$$