36 Properties of Logarithms

Due:
12/15/2015 at 06:00am EST.

Students will be able to:

- Use properties of logarithms to expand logarithmic expressions into a sum or difference of logarithms
- Use properties of logarithms to collapse logarithmic expressions into a single logarithm

Functions and symbols that WeBWorK understands.

Links to some useful WeBWorK pages for students

1. (1 pt) Write the expression as a sum and/or difference of logarithms.
Express powers as factors. **Assume** $0 < x < 1$**.**

$\ln\left(x^5\sqrt{1-x}\right) =$ _____

2. (1 pt) Write the expression as a sum and/or difference of logarithms.
Express powers as factors. **Assume** $x > 0$**.**

$\ln\left(x\sqrt{1+x^3}\right) =$ _____

3. (1 pt) Write the expression as a sum and/or difference of logarithms.
Express powers as factors. **Assume** $x > 2$**.**

$\log\left(\dfrac{x^3\sqrt{x+1}}{(x-2)^5}\right) =$ _____

4. (1 pt) Expand the expression as much as possible into a sum and/or difference of logarithms and express powers as factors. **Assume** $x > 4$**.**

$\ln\left(\dfrac{9x\sqrt{1+3x}}{(x-4)^4}\right) =$ _____

5. (1 pt) Expand the expression as much as possible into a sum and/or difference of logarithms and express powers as factors. **Assume** $0 < x < 1$**.**

$\ln\left(\dfrac{5x^6\left(\sqrt{1-x}\right)^5}{7(x+1)^2}\right) =$ _____

6. (1 pt) If $\ln\ a = 2$, $\ln\ b = 3$, and $\ln\ c = 5$, evaluate the following:

(a) $\ln\left(\dfrac{a^4}{b^1c^2}\right) =$ _____

(b) $\ln\sqrt{b^2c^{-2}a^{-1}} =$ _____

(c) $\dfrac{\ln\left(a^3b^{-2}\right)}{\ln(bc)^4} =$ _____

(d) $(\ln\ c^{-2})\left(\ln\dfrac{a}{b^4}\right)^3 =$ _____

7. (1 pt) Write the expression as a sum and/or difference of logarithms.
Express powers as factors.

$\ln(r^9s^{10}\sqrt[9]{r^3s^4}) =$ _____

8. (1 pt) Write the expression as a sum and/or difference of logarithms.
Express powers as factors.

$\ln(19x(x-16)) =$ _____

9. (1 pt) Write the expression as a sum and/or difference of logarithms.
Express powers as factors. Assume $x > 0$ and $y > 0$.

$\log\left(x^{18}y^9\right) =$ _____

10. (1 pt) Write the expression as a sum and/or difference of logarithms.
Express powers as factors. Assume $x > 0$ and $y > 0$.

$\log\left(x^{13}\left(y^{16}\right)^{\frac{1}{3}}\right) =$ _____

11. (1 pt) Write the expression as a sum and/or difference of logarithms.
Express powers as factors. Assume $x > 0$ and $y > 0$.

$\ln\left((xy)^{1/4}\right) =$ _____

12. (1 pt) Write the expression as a sum and/or difference of logarithms. Express powers as factors.

$\log\left(\dfrac{x^{19}y^{14}}{z^6}\right) =$ _____

13. (1 pt) Write the expression as a sum and/or difference of logarithms. Express powers as factors.

$$\log\left(x^5\sqrt{\frac{y^{20}}{z^6}}\right) = \_\_\_\_\_$$

14. (1 pt) Use the Laws of logarithms to rewrite the expression in a form with no logarithm of a product, quotient or power.

$$\log\sqrt{\frac{x^2+6}{(x^2+20)(x^3-2)^{18}}} = \_\_\_\_\_.$$

15. (1 pt) Write the expression as a sum and/or difference of logarithms.
Express powers as factors. Assume $x > 0$.

$$\ln\left(\frac{x^{17}\sqrt{x-1}}{3x-17}\right) = \_\_\_\_\_$$

16. (1 pt) Rewrite the expression $\log_2 x + 4\log_2 y - 5\log_2 z$ as a single logarithm.

$\log_2 x + 4\log_2 y - 5\log_2 z = \log_2\Big(\_\_\_\_\_\Big)$

17. (1 pt) Rewrite the expression $5\log x - 2\log(x^2+1) + 5\log(x-1)$ as a single logarithm.

$5\log x - 2\log(x^2+1) + 5\log(x-1) = \log\Big(\_\_\_\_\_\Big)$

18. (1 pt) Rewrite the expression $\ln(a+b) + 3\ln(a-b) - 3\ln c$ as a single logarithm.

$\ln(a+b) + 3\ln(a-b) - 3\ln c = \ln\Big(\_\_\_\_\_\Big)$

19. (1 pt) Rewrite the expression $\ln 6 + 5\ln x + 5\ln(x^2+8)$ as a single logarithm.

$\ln 6 + 5\ln x + 5\ln(x^2+8) = \ln\Big(\_\_\_\_\_\Big)$

20. (1 pt) Write the expression as a sum and/or difference of logarithms.
Express powers as factors. Assume $x > 0$.

$\log\sqrt[5]{x^2+19}$ = _____