

Expand or condense the logarithm

1. $\log_3 \frac{\sqrt{x}}{27z^4}$

$$\frac{1}{2} \log_3 x - 3 - 4 \log_3 z$$

2. $\log \pi + 2 \log w - \log 2$

$$\log \frac{\pi w^2}{2}$$

3. $2 \log_2 (2x) - 3 \log_2 y - \log_2 z$

$$\log_2 \frac{4x^2}{y^3 z}$$

4. $2(\log 2x - \log y) - (\log 3 + 2 \log 5)$

$$\log \frac{4x^2}{75y^2}$$

5. $\log_4 \sqrt{\frac{a^3 \sqrt{c}}{b}}$

$$\frac{1}{4} (3 \log_4 a + \frac{1}{2} \log_4 c - \log_4 b)$$

6. $3 \log a + \frac{1}{3} \log(b+1) - \log 7$

$$\log \frac{a^3 \sqrt[3]{b+1}}{7}$$

7. $5 \log_4 2 + 2 \log_4 5$

$$\log_4 800$$

8. $\log \frac{a^2 \sqrt[3]{b}}{4c^5}$

$$2 \log a + \frac{1}{3} \log b - \log 4 - 5 \log c$$

$$9. \frac{1}{6} \log 8 - \frac{1}{4} \log 9 + \frac{1}{2} \log 24$$

$$\log \frac{\sqrt[4]{8} \cdot \sqrt{24}}{\sqrt[4]{9}}$$

* You should rationalize this... will not be on test *

$$10. \log_4 \frac{4a^5}{3b^3}$$

$$1 + 5 \log_4 a - \log_4 3 - 3 \log_4 b$$

$$11. \ln y - 2(\ln x + \ln x)$$

$$\ln \frac{y}{x^4}$$

$$12. \log \frac{(x+2)y^2}{z^7}$$

$$\log(x+2) + 2 \log y - 7 \log z$$

$$13. \frac{1}{4} \log_5 81 - \left(2 \log_5 6 - \frac{1}{2} \log_5 4 \right)$$

$$\log_5 \frac{1}{6}$$

$$14. 2(\log_6 15 - \log_6 5) + \frac{1}{2} \log_6 \frac{1}{25}$$

$$\log_6 \frac{9}{5}$$

$$15. \log_3 \left(\frac{4(x-5)^2}{x^4(x-1)^3} \right)$$

$$\log_3 4 + 2 \log_3(x-5) - 4 \log_3 x - 3 \log_3(x-1)$$

$$16. \frac{1}{2} \log_7(81y^{12}) - \log_7(3) + \log_7(2y^2)$$

$$\log_7 6y^8$$