

4.5 Extra Practice

Expand each expression.

1. $\log_a \left(\frac{x^2 y^3}{m+n} \right)$

2. $\log_3 \sqrt{9a^7}$

3. $5 \log_4 \left(\frac{a^2 b}{n^3} \right)$

4. $\log_2 \left(\frac{b}{c} \right)^4$

5. $4 \log_a \left(\frac{p^6 + q^2}{r^2 - s^2} \right)$

Condense each expression into a single logarithm.

6. $4 \log_5 x + 5 \log_5 y - \log_5 z$

7. $12 \log_7 n - 3 \log_7 p + 3 \log_7 m$

8. $\frac{1}{3}(4 \log s + \log t)$

9. $40 \log_8 t - (8 \log_8 w + 16 \log_8 x)$

10. $\ln x \cdot \ln 2$

For the given values, rewrite each expression in terms of x , y , and z .

$x = \log 2$	$y = \log 8$	$z = \log 12$
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11. $\log 24$

12. $\log 4$

13. $\log 6$

14. $\log 40$

15. $\log 32$

16. $\log 120$

For the given values, rewrite each expression in terms of a , b , and c .

$a = \log 6$	$b = \log 15$	$c = \log 3$
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17. $\log 45$

18. $\log 5$

19. $\log 20$

20. $\log 90$

ANSWERS

- $2\log_a x + 3\log_a y - \log_a(m+n)$
- $1 + \frac{7}{2}\log_3 a$
- $10\log_4 a + 5\log_4 b - 15\log_4 n$
- $4\log_2 b - 4\log_2 c$
- $4\left[\log_a(p^6 + q^2) - \log_a(r+s) - \log_a(r-s)\right]$
- $\log_5\left(\frac{x^4 y^5}{z}\right)$
- $\log_7\left(\frac{n^4 m}{p}\right)^3$
- $\log\sqrt[3]{s^4 t}$
- $\log_8\left(\frac{t^5}{wx^2}\right)^8$
- Can't be condensed; $\ln x \cdot \ln 2$
- $x+z$
- $y-x$ OR $2x$
- $z-x$
- $y-x+1$
- $2x+y$ OR $5x$
- $z+1$
- $b+c$
- $b-c$
- $a-c+1$
- $a+b$ OR $2c+1$