

Convert into exponential form and solve for x.

1)  $\log_2 8 = x$

2)  $\log_x 32 = 5$

3)  $\log_3 x = 4$

4)  $\log_7 7 = x$

Expand these logarithmic expressions.

5)  $\log_2 xy$

6)  $\log_3 c^4$

7)  $\log_5 a^2bc^3$

8)  $\log_6 \frac{xy}{z}$

9)  $\log_7 \frac{q^2r^3}{s^4}$

10)  $\log_4 \frac{a^3b^5}{c^2d^6}$

Contract these logarithmic expressions.

11)  $\log_3 r + \log_3 5$

12)  $\log_2 k - \log_2 g - \log_2 h$

13)  $3\log_5 a + 2\log_5 b + 7\log_5 c$

14)  $6\log_4 u + 7\log_4 v - 5\log_4 w$

Simplify these expressions.

15)  $(4v^3)(5v^6)$

16)  $\frac{3h^5}{6h^2}$

17)  $\left(\frac{2k^7j^{10}}{k^3j^5}\right)^2$

18)  $\left(\frac{3d^2e^6}{d^5e^2}\right)^2$