

Algebra 2 // Topic 6 // Solving Logs D

Rewrite the following expressions as a quotient of common logs.

1. $\log_5 20$
$$\frac{\log 20}{\log 5}$$

2. $\log_3 8$
$$\frac{\log 8}{\log 3}$$

3. $\log_4 7$
$$\frac{\log 7}{\log 4}$$

Expand the following expressions:

4. $\log 5x^6 = \log 5 + \log x^6$
$$= \log 5 + 6 \log x$$

5. $\log a^6 b^7 c^3$
$$= \log a^6 + \log b^7 + \log c^3$$

$$= 6 \log a + 7 \log b + 3 \log c$$

6. $\log_9 \frac{8c}{d} = \log_9 8c - \log_9 d$
$$= \log_9 8 + \log_9 c - \log_9 d$$

7. $\log \sqrt{xyz} = \log (xyz)^{1/2}$
$$= \frac{1}{2} \log xyz$$

$$= \frac{1}{2} \log x + \frac{1}{2} \log y + \frac{1}{2} \log z$$

8. $\log_3 \frac{7z^6}{k} = \log_3 7z^6 - \log_3 k$
$$= \log_3 7 + \log_3 z^6 - \log_3 k$$

$$= \log_3 7 + 6 \log_3 z - \log_3 k$$

9. $\log \sqrt[3]{2jk} = \log (2jk)^{1/3}$
$$= \frac{1}{3} \log 2jk$$

$$= \frac{1}{3} \log 2 + \frac{1}{3} \log j + \frac{1}{3} \log k$$

Condense the following expressions:

10. $\log 8 - \log 6 = \log \frac{8}{6}$
$$= \log \frac{4}{3}$$

11. $\log 14 + \log a + \log b$
$$= \log 14ab$$

12. $5 \log a - \log b = \log a^5 - \log b$
$$= \log a^5 - \log b$$

13. $\log_2 3 + 2 \log_2 3 - \log_2 y$
$$= \log_2 3 + \log_2 3^2 - \log_2 y$$

$$= \log_2 3 \cdot 9 - \log_2 y = \log_2 27 - \log_2 y$$

$$= \log_2 \frac{27}{y}$$

14. $8 \log 3 + 4 \log d + 2 \log f$
$$= \log 3^8 + d^4 + \log f^2$$

$$= \log_3 3^8 d^4 f^2$$

15. $4(\log 3 + \log p)$
$$= \log 3^4 + \log p^4$$

$$= \log 81 p^4$$

16. $15 \log a - (\log 6 + 3 \log b + 4 \log c)$
$$= \log a^{15} - (\log 6 + \log b^3 + \log c^4)$$

$$= \log a^{15} - (\log 6 b^3 c^4)$$

$$= \log \frac{a^{15}}{6 b^3 c^4}$$

17. $\log_3 5 + 6 \log_3 x - \log_3 4$
$$= \log_3 5 + \log_3 x^6 - \log_3 4$$

$$= \log_3 5x^6 - \log_3 4 = \log_3 \frac{5x^6}{4}$$

18. $\frac{1}{2} \log_7 81 - \frac{1}{2} \log_7 49 = \log_7 81^{1/2} - \log_7 49^{1/2}$
$$= \log_7 9 - \log_7 7 = \log_7 \frac{9}{7}$$

19. $2(\log 12 - \log 4) + \frac{1}{2} \log \frac{1}{9}$
$$= 2(\log \frac{12}{4}) + \log \frac{1}{9}^{1/2}$$

$$= 2 \log 3 + \log \frac{1}{3}$$

$$= \log 9 + \log \frac{1}{3}$$

$$= \log 3$$