Answer key

The method: Expanding and condensing logs

Product: add logs. Quotient: subtract logs. Power: the exponent moves to the front. To condense, go the other way.

$$4\log_2 x + \log_2 4 = \log_2 x^4 + \log_2 4 = \log_2 (4x^4)$$

move 4 up as a power, then multiply inside

$$\log_2 (4x^4) = \log_2 4 + \log_2 x^4 = 2 + 4\log_2 x$$

product: add the logs; power: bring 4 to the front; $2^2 = 4$

$$3\log_3 x - \log_3 8 = \log_3 x^3 - \log_3 8 = \log_3 \frac{x^3}{8}$$

move 3 up as a power, then divide inside

Problems 1 and 2 worked out · Version 0A

$$\log_2 (4x^2) = \log_2 4 + \log_2 x^2 = 2 + 2\log_2 x$$

product: add the logs; power: bring 2 to the front; $2^2 = 4$

$$\log_3 \frac{x^3}{27} = \log_3 x^3 - \log_3 27 = 3\log_3 x - 3$$

quotient: subtract the logs; power: bring 3 to the front

Expanding and condensing logs · Version 0A

1) $2 + 2\log_2 x$ 2) $3\log_3 x - 3$ 3) $\log_5 (4x^5)$

4) $3 + 3\log_3 x$ 5) $\log (7x^5)$ 6) $2 + 4\log_3 x$

7) $\log_2 (4x^4)$ 8) $\log_2 (3x^3)$ 9) $\log_2 (5x^4)$

10) $\log_3 (3x^2)$ 11) $5\log_3 x - 2$ 12) $\log (2x^5)$

13) $\log_3 \frac{x^3}{6}$ 14) $4\log_3 x - 3$ 15) $5\log_3 x - 3$

16) $\log_3 \frac{x^5}{6}$ 17) $\log_5 (8x^3)$ 18) $\log_2 (9x^3)$ 19) $\log_3 \frac{x^4}{6}$

20) $3 + 3\log_3 x$ 21) $2\log_3 x - 1$ 22) $2\log_2 x - 1$

23) $3 + 5\log_5 x$ 24) $2\log_3 x - 1$ 25) $\log_3 \frac{x^5}{4}$

26) $4\log_2 x - 3$ 27) $2 + 4\log_5 x$ 28) $1 + 3\log_5 x$

29) $3\log x - 1$ 30) $4\log_5 x - 3$ 31) $\log_2 \frac{x^2}{2}$

32) $2\log_2 x - 2$ 33) $\log (2x^2)$ 34) $4\log_2 x - 1$