

Why did Grok jump up and down the first time he saw a variable in Algebra class?

Solve each problem below. Find your answer in the answer column and notice the two letters next to it. Write these letters in the two boxes that contain the number of that exercise.

Expand the following :

1. $\log_2 \sqrt{x}$

2. $\log_7 \frac{3x^2}{2y^3}$

3. $\ln \frac{x^4 \sqrt{y}}{z^5}$

4. $\ln \sqrt{\frac{x^2}{y}}$

5. $\log_7 (x+2)^3$

Condense the following :

6. $6 \ln x + 4 \ln y$

7. $\ln 40 + 2 \ln \frac{1}{2} + \ln x$

8. $5 \log_9 x + 7 \log_9 y - 3 \log_9 z$

9. $\frac{1}{2} (\ln x + 3 \ln x) - \ln(x+2)$

10. $7 \ln x - (3 \ln y + 8 \ln z)$

11. $2 [\log(x-3) + \log(x+3)] + \log x$

(BI) $\ln \frac{3x}{x+2}$

(NG) $4 \ln x + \frac{1}{2} \ln y - 5 \ln z$

(MO) $\ln x^6 y^4$

(VE) $4 \ln x + 2 \ln y - 5 \ln z$

(SA) $\frac{1}{2} \log_2 x$

(SI) $\ln \frac{x^2}{x+2}$

(WA) $\ln 10x$

(NT) $\log_7 3 + 2 \log_7 x - \log_7 2 - 3 \log_7 y$

(ME) $\log_9 \frac{x^5 y^7}{z^3}$

(NX) $\log x(x^2 - 9)^2$

(GH) $3 \log_7 (x+2)$

(TI) $\ln \frac{x^7}{y^3 z^8}$

(IT) $\ln x - \frac{1}{2} \ln y$

(NA) $\log_7 3 + 2 \log_7 x - \log_7 2 + 3 \log_7 y$

(LL) $\ln 20x$

(KI) $\log x(x-3)^2$

4	4	7	7	1	1	11	11	9	9	5	5	10	10	3	3	6	6	8	8	2	2	
I	T	W	A	S	S	A	N	X	S	I	G	H	T	I	N	G	M	O	M	E	N	T

Pre-calc Expand / Condense puzzle

SA ① $\log_2 X^{1/2} = \frac{1}{2} \log_2 X$

NT ② $\log_7 3x^2 - \log_7 2y^3$
 $= \log_7 3 + \log_7 x^2 - (\log_7 2 + \log_7 y^3)$
 $= \log_7 3 + 2\log_7 x - (\log_7 2 + 3\log_7 y)$
 $= \log_7 3 + 2\log_7 x - \log_7 2 - 3\log_7 y$

NG ③ $\ln x^4 y^{1/2} - \ln z^6$
 $= \ln x^4 + \ln y^{1/2} - \ln z^6$
 $= 4\ln x + \frac{1}{2}\ln y - 6\ln z$

IT ④ $\ln \left(\frac{x^2}{y} \right)^{1/2} = \ln \frac{x^{2/2}}{y^{1/2}} = \ln x - \ln y^{1/2} = \ln x - \frac{1}{2}\ln y$

GH ⑤ $\log_7 (x+2)^3 = 3\log_7 (x+2)$

MO ⑥ $\ln x^6 + \ln y^4 = \ln x^6 y^4$

WA ⑦ $\ln 40 + \ln \left(\frac{1}{2} \right)^2 + \ln x$
 $= \ln 40 + \ln \frac{1}{4} + \ln x$
 $= \ln 10 + \ln x$
 $= \ln 10x$

ME ⑧ $\log_4 x^5 + \log_4 y^7 - \log_4 z^3$
 $= \log_4 x^5 y^7 - \log_4 z^3$
 $= \log_4 \frac{x^5 y^7}{z^3}$

SI ⑨ $(\ln x + \ln x^3)^{1/2} - \ln(x+2)$
 $= (\ln x^4)^{1/2} - \ln(x+2)$
 $= \ln x^{4/2} - \ln(x+2)$
 $= \ln x^2 - \ln(x+2) = \frac{\ln x^2}{x+2}$

$$\begin{aligned} \text{T1 } \textcircled{10} \quad & \ln x^7 - (\ln y^3 + \ln z^8) \\ &= \ln x^7 - (\ln y^3 z^8) \\ &= \ln \frac{x^7}{y^3 z^8} \end{aligned}$$

$$\begin{aligned} \text{NX } \textcircled{11} \quad & 2[\log(x-3)(x+3)] + \log x \\ &= [\log(x^2-9)]^2 + \log x \\ &= \log(x^2-9)^2 \cdot x \\ &= \log x(x^2-9)^2 \end{aligned}$$