N: Key D: _____ P: 0 1 2 3 4 5 6

Algebra 2 // Topic 6 // **Natural Logs A**

D: Solve the following equations for x. Recall: ln is simply $\log_e$

▼ Evaluate the following expressions. (Express as a single number)

1. $\ln e$ 1
2. $\ln e^2$ 2
3. $\ln 1$ 0
4. $\ln e^3 + 1$ $3+1=4$
5. $\ln e + \ln e^4$ $1+4=5$

▼ Expand the following expressions

6. $\ln\left(\frac{4ab}{c}\right) = \ln 4ab - \ln c$
$= \ln 4 + \ln a + \ln b - \ln c$

7. $\ln(ab^3c)$
$= \ln a + \ln b^3 + \ln c$
$= \ln a + 3\ln b + \ln c$

8. $\ln\sqrt{a^3b}$
$= \ln(a^3b)^{1/2}$
$= \frac{1}{2}\ln a^3b$
$= \frac{1}{2}\ln a^3 + \frac{1}{2}\ln b$
$= \frac{3}{2}\ln a + \frac{1}{2}\ln b$

▼ Condense the following expressions

9. $\frac{1}{2}\ln 2 + \frac{1}{2}\ln x - 3\ln y$
$= \ln 2^{1/2} + \ln x^{1/2} - \ln y^3$
$= \ln(2x)^{1/2} - \ln y^3$
$= \ln\sqrt{2x} - \ln y^3$
$= \ln\frac{\sqrt{2x}}{y^3}$

10. $3\ln x - 5\ln y$
$= \ln x^3 - \ln y^5$
$= \ln\frac{x^3}{y^5}$

11. $2\ln x - (3\ln a + 4\ln b)$
$= \ln x^2 - (\ln a^3 + \ln b^4)$
$= \ln x^2 - (a^3b^4)$
$= \ln\frac{x^2}{a^3b^4}$

▼ Solve for x

12. $e^x \cdot e^{3x} = 15$
$e^{4x} = 15$
$\ln 15 = 4x$
$\frac{\ln 15}{4} = \frac{4x}{4}$
$x = \frac{\ln 15}{4}$

13. $4(e^x) = 28$
$\frac{4}{4} \quad \frac{28}{4}$
$e^x = 7$
$\ln 7 = x$

14. $\frac{1}{2}e^x = 2$ ·2
$e^x = 4$
$\ln 4 = x$

15. $\ln x = 5$
$e^5 = x$

16. $5\ln x - 4 = 1$
$+4 \quad +4$
$\frac{5\ln x}{5} = \frac{5}{5}$
$\ln x = 1$
$e^1 = x$

17. $3\ln(x+1) = 6$
$\frac{3}{3} \quad \frac{6}{3}$
$\ln(x+1) = 2$
$e^2 = x+1$
$-1 \quad -1$
$x = e^2 - 1$