#4 Pre-Calculus Worksheet Name: Key

Property of Logs

Use the properties of logarithms to EXPAND the expression. SHOW YOUR WORK.

1. $\log 5x^2y$

$\log 5 + 2\log x + \log y$

2. $\ln \frac{6}{xz^4}$

3. $\ln 2\sqrt{z}$

$\ln 2 + \frac{1}{2}\ln z$

4. $\ln \sqrt[4]{\frac{x^3y}{z^2}}$

Use the properties of logarithms to CONDENSE the expression. SHOW YOUR WORK.

5. $2\ln 8 - 5\ln x + 3\ln y$

$\ln \frac{8^2 \cdot y^3}{x^5}$

$\ln \frac{64y^3}{x^5}$

6. $2\log_2(x+4)$

7. $-4\log_6(2x)$

$\log_6 (2x)^{-4}$

$\log_6 \frac{1}{16x^4}$

8. $3\log_3 x - 4\log_3 y - 2\log_3 z$

Find the exact value of the logarithmic expression WITHOUT the calculator. SHOW YOUR WORK.

9. $\log_6 \sqrt[3]{6} = x$

$6^x = 6^{\frac{1}{3}}$

$x = \frac{1}{3}$

10. $\log_5 20 - \log_5 4$

$x = 1$

11. $\log_4 8 + \log_4 2 - \log_4 \left(\frac{1}{4}\right)$

$\log_4 \frac{8(2)}{\frac{1}{4}}$

$\log_4 64$

$\log_4 4^3$

$= 3$

12. $\ln e^8 + \ln e^{\frac{1}{2}} - \ln e^{-3}$

$x \approx 11.5$

Solve each WITHOUT the calculator. SHOW YOUR WORK

19. $\log_x \frac{1}{32} = 5$

$\frac{1}{32} = x^5$

$2^{-5} = x^5$

$\left(\frac{1}{2}\right)^5 = x^5$

$x = \frac{1}{2}$

20. $\log_x 36 = 2$

$x = 6$

21. $e^{4x} = e^{x^2+3}$

$4x = x^2 + 3$

$0 = x^2 - 4x + 3$

$0 = (x-1)(x-3)$

$x = 1$ or 3

2

22. $\log_x 25 = 2$

$x = 5$

23. $7 - 2e^x = 5$

$-2e^x = -2$

$e^x = 1$

$x = 0$

24. $\log_3 27 = x + 6$

$x = -3$

25. $\ln\sqrt{x+2} = 0$

$e^0 = \sqrt{x+2}$

$1 = \sqrt{x+2}$

$1 = x+2$

$-1 = x$

26. $\log_6(x^2+5) = \log_6 41$

$x^2 + 5 = 41$

$x^2 = 36$

$x = \pm 6$

27. $\log_7 6x = \log_7 9 + \log_7(x-4)$

$\log_7 6x = \log_7 9(x-4)$

$6x = 9x - 36$

$36 = 3x$

$x = 12$

28. $\log_{11} 3x = \log_{11}(x+5) - \log_{11} 2$

$x = 11$

Solve each WITH the calculator, round to 3 decimal places. SHOW YOUR WORK

29. $2^x - 1 = 8$

$2^x = 9$

$\log_2 9 = x$

$x \approx 3.170$

30. $5 - 7^{x-1} = -4$

$x \approx 2.129$

31. $6^x + 10 = 47$

$6^x = 37$

$\log_6 37 = x$

$x \approx 2.015$

32. $5^{2x+3} + 5 = 25$

$x \approx -0.569$

33. $2 - 6\ln x = 10$

$-6\ln x = 8$

$\ln x = -\frac{4}{3}$

$x = e^{-\frac{4}{3}}$

$x \approx 0.264$

34. $2 + 3\log 3x = 5$

$x = \frac{10}{3}$

35. $14 + 20\ln 7x = 54$

$20\ln 7x = 40$

$\ln 7x = 2$

$7x = e^2$

$x = \frac{e^2}{7}$

$x \approx 1.056$