Homework 3.1: Intro to Logarithms

Name: Key!

Math 3

Directions: Write each equation in logarithmic form.

1. $9^2 = 81$ → $\log_9 81 = 2$

2. $\frac{1}{64} = \left(\frac{1}{4}\right)^3$ → $\log_{\frac{1}{4}}\left(\frac{1}{64}\right) = 3$

3. $8^3 = 512$ → $\log_8 512 = 3$

4. $\left(\frac{1}{3}\right)^{-2} = 9$ → $\log_{\frac{1}{3}} 9 = -2$

5. $2^9 = 512$ → $\log_2 512 = 9$

6. $4^5 = 1024$ → $\log_4 1024 = 5$

7. $5^4 = 625$ → $\log_5 625 = 4$

8. $10^{23} = 0.001$ → $\log 0.001 = 23$

Directions: Write each equation in exponential form.

7) $\log_{13} 169 = 2$ → $13^2 = 169$

8) $\log_5 125 = 3$ → $5^3 = 125$

9) $\log_9 \frac{1}{81} = -2$ → $9^{-2} = \frac{1}{81}$

10) $\log_{169} 13 = \frac{1}{2}$ → $169^{1/2} = 13$

11) $\log_y x = \frac{2}{3}$ → $y^{2/3} = x$

12) $\log_y 76 = x$ → $y^x = 76$

Directions: Evaluate each logarithm.

9. $\log_2 128$ → 7

10. $\log_4 32$ → 2.5

11. $\log_9 (27)$ → 1.5

12. $\log_2 (-32)$ → No Solution

13. $\log_{\frac{1}{3}} \frac{1}{9}$ → 2

14. $\log 100{,}000$ → 5

15. $\log_7 7^6$ → 6

16. $\log_3 \frac{1}{81}$ → -4

Directions: Solve each equation below. Show all work in the space provided.

1. $\log_4 x = 3$

$4^3 = x$

$x = 64$

2. $\log_3 x = -2$

$3^{-2} = x$

$x = \frac{1}{9}$

3. $\log (x + 1) = 2$

$10^2 = x+1$

$100 = x+1$

$x = 99$

4. $\log_5 (2x - 1) = 2$

$5^2 = 2x-1$

$25 = 2x-1$

$26 = 2x$

$x = 13$

21. $5^x = 625$

$\log_5 625 = x$

$x = 4$

22. $4^x = 64$

$\log_4 64 = x$

$x = 3$

23. $2^{x+1} = \frac{1}{8}$

$\log_2 \frac{1}{8} = x+1$

$-3 = x+1$

$x = -4$

26. $3^{2x-1} = 27$

$\log_3 27 = 2x-1$

$3 = 2x-1$

$4 = 2x$

$x = 2$

29. $4^{x+1} = 12$

$\log_4 12 = x+1$

$1.8 = x+1$

$0.8 = x$

32. $6^{x-3} = 21$

$\log_6 21 = x-3$

$1.7 = x-3$

$x = 4.7$

1) $\log 5x = \log (2x + 9)$

$5x = 2x+9$

$3x = 9$

$x = 3$

2) $\log (10 - 4x) = \log (10 - 3x)$

$10-4x = 10-3x$

$10-1x = 10$

$-1x = 0$

$x = 0$

3) $\log (4p - 2) = \log (-5p + 5)$

$4p-2 = -5p+5$

$9p-2 = 5$

$9p = 7$

$p = 7/9$

4) $\log (4k - 5) = \log (2k - 1)$

$4K-5 = 2K-1$

$2K-5 = -1$

$2K = 4$

$K = 2$

5) $\log (-2a + 9) = \log (7 - 4a)$

$-2a+9 = 7-4a$

$2a+9 = 7$

$2a = -2$

$a = -1$