8.1 Intro to Logs

PRACTICE

DIRECTIONS: Rewrite each exponential function as a logarithmic function.

1) $5^3 = 125$

$\log_5 125 = 3$

2) $4^{-3} = \frac{1}{64}$

$\log_4 \frac{1}{64} = -3$

3) $2^{-5} = \frac{1}{32}$

$\log_2 \frac{1}{32} = -5$

4) $e^0 = 1$

$\log_e 1 = 0$ or $\ln 1 = 0$

5) $4^{\frac{3}{2}} = 8$

$\log_4 8 = \frac{3}{2}$

6) $\frac{1}{3}^{-3} = 27$

$\log_{\frac{1}{3}} 27 = -3$

Rewrite each log as an exponential.

7) $log_3 27 = 3$

$3^3 = 27$

8) $log_2 16 = 4$

$2^4 = 16$

9) $log_{\frac{1}{3}} 81 = -4$

$\frac{1}{3}^{-4} = 81$

10) $log_5 \frac{1}{125} = -3$

$5^{-3} = \frac{1}{125}$

11) $log_4 8 = \frac{3}{2}$

$4^{\frac{3}{2}} = 8$

12) $\log 100 = 2$

$10^2 = 100$

Find the following logs by rewriting exponentially or explain why they don't make sense.

13) $log_2 32 = x$

$2^x = 32 \rightarrow 2^x = 2^5$

$\boxed{x = 5}$

14) $log_{\frac{1}{4}} 256 = x$

$\frac{1}{4}^x = 256 \rightarrow 4^{-x} = 256$

$4^{-x} = 4^4 \rightarrow -x = 4$

$\boxed{x = -4}$

15) $log 1000 = x$

$10^x = 1000 \rightarrow 10^x = 10^3$

$\boxed{x = 3}$

16) $log_2 \frac{1}{64} = x$

$2^x = \frac{1}{64} \rightarrow 2^x = 64^{-1}$

$2^x = 2^{-6}$

$\boxed{x = -6}$

17) $log_1 7 = x$

$1^x = 7$

CAN'T WORK! NO EXPONENT W/ BASE 1 WILL EQUAL 7.

18) $log_{\frac{7}{10}} \frac{10}{7} = x$

$\frac{7}{10}^x = \frac{10}{7} \rightarrow \frac{7}{10}^x = \frac{7}{10}^{-1}$

$x = -1$

If $f(x) = log_4 x$, find the following.

19) $f(4)$

$f(4) = \log_4 4$

$y = \log_4 4$

$4^y = 4^1$

$y = 1$ so $\boxed{f(4) = 1}$

20) $f\left(\frac{1}{32}\right)$

$f\left(\frac{1}{32}\right) = \log_4 \frac{1}{32}$

$y = \log_4 \frac{1}{32}$

$4^y = \frac{1}{32} \rightarrow 2^{2y} = 2^{-5}$

$2y = -5$

$\boxed{y = -\frac{5}{2}}$

21) $f(\sqrt{8})$

$f(\sqrt{8}) = \log_4 \sqrt{8}$

$y = \log_4 \sqrt{8}$

$4^y = \sqrt{8} \rightarrow 2^{2y} = 8^{1/2}$

$2^{2y} = 2^{3(\frac{1}{2})}$

$2^{2y} = 2^{3/2}$

$2y = \frac{3}{2}$

$\boxed{y = 3/4}$

If $f(x) = log_3 x$, find the following.

22) $f(243)$

$f(243) = \log_3 243$

$y = \log_3 243$

$3^y = 243 \rightarrow 3^y = 3^5$

$\boxed{y = 5}$

23) $f\left(\frac{1}{27}\right)$

$f\left(\frac{1}{27}\right) = \log_3 \frac{1}{27}$

$y = \log_3 \frac{1}{27}$

$3^y = \frac{1}{27} \rightarrow 3^y = 3^{-3}$

$\boxed{y = -3}$

24) $f(\sqrt{27})$

$f(\sqrt{27}) = \log_3 \sqrt{27}$

$y = \log_3 \sqrt{27}$

$3^y = \sqrt{27} \rightarrow 3^y = 27^{1/2}$

$3^y = 3^{3(\frac{1}{2})}$

$3^y = 3^{3/2}$

$\boxed{y = 3/2}$

Use your calculator to find the following logs to the nearest thousandth.		
25) $log_8 59$ $1.96088 \approx \boxed{1.961}$	26) $log_{23} 600$ $2.0401 \approx \boxed{2.040}$	27) $\ln 54$ $3.98898 \approx \boxed{3.989}$
Directions: Multiply.	**Directions: Divide**	**Directions: Solve**
28) $(2\sqrt{10} - 3\sqrt{2})(\sqrt{10} + 4\sqrt{2})$ $2\sqrt{100} + 8\sqrt{20} - 3\sqrt{20} - 12\sqrt{4}$ $2(10) + 5\sqrt{20} - 12(2)$ $20 + 5\sqrt{4}\sqrt{5} - 24$ $-4 + 5(2)\sqrt{5}$ $\boxed{-4 + 10\sqrt{5}}$	29) $\frac{10}{(2-\sqrt{7})} \frac{(2+\sqrt{7})}{(2+\sqrt{7})}$ $= \frac{20 + 10\sqrt{7}}{4 - 7}$ $\boxed{= \frac{20+10\sqrt{7}}{-3}}$ $m = -6$ $\sqrt{(-6)^2 + 2(-6) + 1} = 5$ $\sqrt{36 - 12 + 1} = 5$ $\sqrt{25} = 5$ $5 = 5$ ✓	30) $(\sqrt{m^2 + 2m + 1})^2 = 5^2$ $m^2 + 2m + 1 = 25$ $-25 \quad -25$ $m^2 + 2m - 24 = 0$ $(m + 6)(m - 4) = 0$ $m + 6 = 0 \quad m - 4 = 0$ $m = -6 \quad m = 4$ $\sqrt{4^2 + 2(4) + 1} = 5$ $\sqrt{16 + 8 + 1} = 5$ $5 = 5$ ✓