Name_____

The Meaning Of Logarithms

Date_____ Period____

Rewrite each equation in exponential form.

1) $\log_6 36 = 2$

$6^2 = 36$

2) $\log_{289} 17 = \dfrac{1}{2}$

$289^{\frac{1}{2}} = 17$

3) $\log_{14} \dfrac{1}{196} = -2$

$14^{-2} = \dfrac{1}{196}$

4) $\log_3 81 = 4$

$3^4 = 81$

Rewrite each equation in logarithmic form.

5) $64^{\frac{1}{2}} = 8$

$\log_{64} 8 = \dfrac{1}{2}$

6) $12^2 = 144$

$\log_{12} 144 = 2$

7) $9^{-2} = \dfrac{1}{81}$

$\log_9 \dfrac{1}{81} = -2$

8) $\left(\dfrac{1}{12}\right)^2 = \dfrac{1}{144}$

$\log_{\frac{1}{12}} \dfrac{1}{144} = 2$

Rewrite each equation in exponential form.

9) $\log_u \dfrac{15}{16} = v$

$u^v = \dfrac{15}{16}$

10) $\log_v u = 4$

$v^4 = u$

11) $\log_{\frac{7}{4}} x = y$

$\left(\dfrac{7}{4}\right)^y = x$

12) $\log_2 v = u$

$2^u = v$

13) $\log_u v = -16$

$u^{-16} = v$

14) $\log_y x = -8$

$y^{-8} = x$

Rewrite each equation in logarithmic form.

15) $u^{-14} = v$

$\log_u v = -14$

16) $8^b = a$

$\log_8 a = b$

17) $\left(\dfrac{1}{5}\right)^x = y$

$\log_{\frac{1}{5}} y = x$

18) $6^y = x$

$\log_6 x = y$

19) $9^y = x$

$\log_9 x = y$

20) $b^a = 123$

$\log_b 123 = a$

Evaluate each expression.

21) $\log_4 64$

3

22) $\log_6 216$

3

23) $\log_4 16$

2

24) $\log_3 \dfrac{1}{243}$

-5

25) $\log_5 125$

3

26) $\log_2 4$

2

27) $\log_{343} 7$

$\dfrac{1}{3}$

28) $\log_2 16$

4

29) $\log_{64} 4$

$\dfrac{1}{3}$

30) $\log_6 \dfrac{1}{216}$

-3

Simplify each expression.

31) $12^{\log_{12} 144}$

144

32) $5^{\log_5 17}$

17

33) $x^{\log_x 72}$

72

34) $9^{\log_3 20}$

400

You invest $50,000 into a bank that pays 8% annual interest compounded quarterly.

How many years until you have doubled your investment? $A = P\left(1 + \frac{r}{n}\right)^{nt}$

$P = 50,000$

$A = 100,000$

$r = .08$

$n = 4$

$100,000 = 50,000\left(1 + \frac{.08}{4}\right)^{4t}$

$2 = 1.02^{4t}$

$\log_{1.02}(2) = 4t$

$\frac{\log_{1.02}(2)}{4} = t \qquad t = 8.75$

$\boxed{8\frac{3}{4} \text{ years}}$

An <u>exponential function</u> goes through the points (1, 6) and (2, 36) write a model for the function.

variable is in that exponent

$y = ab^x$

$6 = ab^1$

$\frac{6}{b} = a$

$a = 1$

$36 = ab^2$

$36 = 6 \cdot \frac{b^2}{b}$

$6 = b$

$\boxed{y = 1 \cdot 6^x}$

A <u>power function</u> goes through the points (2, 2) and (4, 16) write a model for the function.

raising the variable to another power ~power

$y = ax^b$

$16 = a4^b$

$\frac{16}{4^b} = a$

$\frac{16}{64} = a$

$a = \frac{1}{4}$

$2 = a2^b$

$2 = 16 \cdot \frac{2^b}{4^b}$

$\frac{1}{8} = \left(\frac{1}{2}\right)^b$

$\log_{1/2}\left(\frac{1}{8}\right) = b$

$3 = b$

$\boxed{y = \frac{1}{4} \cdot x^3}$