Introduction to Logarithms 40

We have looked at exponential functions such as $y = 2^x$. The inverse of this function is $x = 2^y$. We can write this as $y = \log_2 x$.

We read this as y equals the logarithm to base two of x.

So in general, we have the two equivalent equations;

$$x = a^y \quad <-> \quad y = \log_a x$$

Example:

We can express the equation $3^2 = 9$, in logarithmic form.

The logarithmic form is $\log_3 9 = 2$.

Example:

We can express the equation $\log_2 16 = 4$, in exponential form.

The exponential form is $2^4 = 16$.

Problems:

1) Express in logarithmic form.

a) $5^2 = 25$ b) $10^3 = 1000$ c) $6^{-2} = 1/36$

d) $8^{1/3} = 2$ e) $a^b = c$ f) $3^t = 15$

2) Express in exponential form.

a) $\log_{10} 100 = 2$ b) $\log_2 16 = 4$ c) $\log_3 243 = 5$

d) $\log_9 27 = 3/2$ e) $\log_{49} 7 = 1/2$ f) $\log_y x = z$

3) Express as a rational number.

a) $\log_{10}10{,}000$ b) $\log_2 2^8$ c) $\log_5(1/125)$

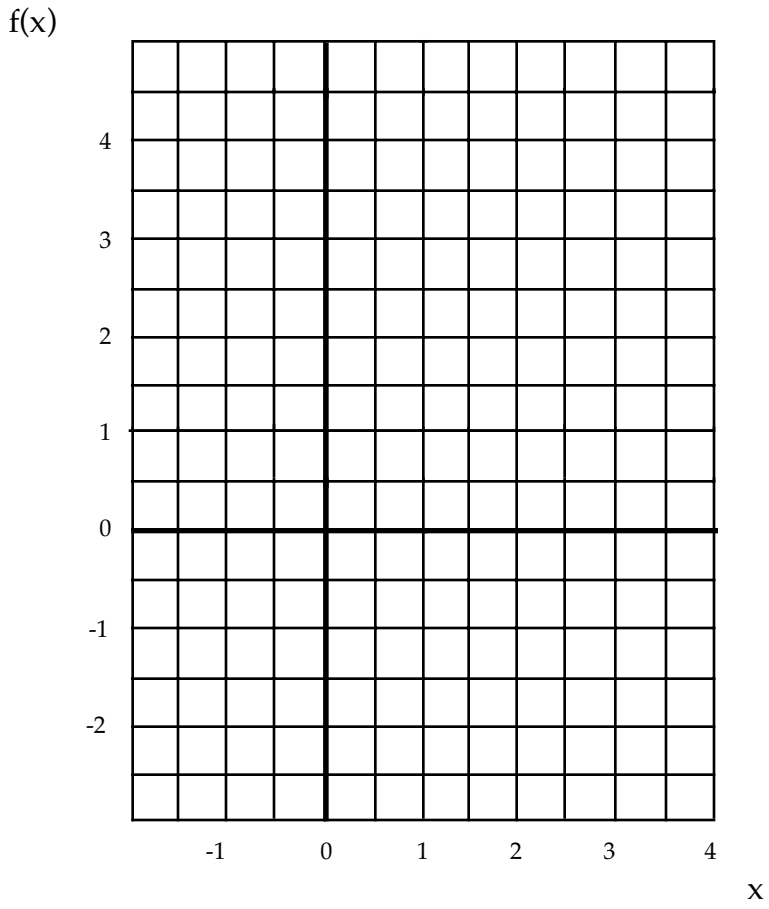
d) $\log_{100}10$ e) $\log_6 216$ f) $\log_4 32$

4) Solve for x.

a) $\log_2 64 = x$ b) $\log_x(1/16) = -2$ c) $\log_{81}3 = x$

d) $\log_9 x = 1/2$ e) $\log_x(4/9) = 2$ f) $\log_{10}x = -3$

5) Graph $f(x) = 2^x$ and $f(x) = \log_2 x$ (same as $x = 2^y$) on grid below.



Answers: 1)a) $\log_5 25 = 2$, b) $\log_{10} 1000 = 3$, c) $\log_6(1/36) = -2$, d) $\log_8 2 = 1/3$, e) $\log_a c = b$, f) $\log_3 15 = t$, 2)a) $10^2 = 100$, b) $2^4 = 16$, c) $3^5 = 243$, d) $9^{3/2} = 27$, e) $49^{1/2} = 7$, f) $y^z = x$, 3)a) 4, b) 8, c) -3, d) 1/2, e) 3, f) 5/2, 4)a) 6, b) 4, c) 1/4, d) 3, e) 2/3, f) 1/1000, 5)