Solve the following for x

$\sqrt{x} = 6$

$\sqrt[3]{x} = 2$

$x = 2^4$

$x^2 = 4$

$2 = 10^x$

$\log_2 8$

Definition of logarithm with base *b*

Let *b* and *y* be positive numbers.

$b \neq 1$. Then we have:

$\log_b y = x$ if and only if $b^x = y$

logarithmic form

exponential form

Can we solve for x now?

$\log_2 8$

$2 = 10^{x}$

Rewrite these in exponential form

$$\log_4 1 = 0$$

$$\log_{12} 12 = 1$$

$$\log_{1/4} 4 = -1$$

$$\log_b 1 = b$$

$$\log_b 0 = 1$$

Evaluate these logs

$$\log_4 64$$

$$\log_5 \frac{1}{2}$$

$$\log_{1/5} 125$$

$$\log_{36} 6$$

Common logarithms

Common Log

$$\log_{10} x = \log x$$

Natural Log

$$\log_e x = \ln x$$

The sales of a video game can be modeled by $20\ln(x-1)+35$, where y is the monthly number (in thousands) of games sold during the xth month after the game is released for same. Estimate the number of video games sold during the 10th month after the game is released.

Inverse functions

The logarithmic function $g(x) = \log_b x$ and the exponential function $f(x)=b^x$ are inverses of each other. So,

$$g(f(x)) = \log_b b^x = x$$

and

$$f(g(x)) = b^{\log_b x} = x$$

Simplify the expressions:

$10^{\log 4}$

$\log_5 25^x$

$e^{\ln 9}$

$\log_3 27^x$

Simplify the expressions:

$8^{\log_8 x}$

$\log_7 7^{-3x}$

$e^{\ln 20}$

$\log_2 64^x$

Graph of log

$g(x) = b^x$

$\rightarrow \quad g(x) = 2^x$

$f(x) = \log_b(x)$

$\rightarrow \quad f(x) = \log_2(x)$

$h: y = x$