

Bell Work

Find the inverse of each function. Is the inverse a function?

$$1) f(x) = 4x - 1$$

$$y = 4x - 1$$

$$x = 4y - 1$$

$$x + 1 = 4y$$

$$\frac{x+1}{4} = y$$

$$f^{-1}(x) = \frac{x+1}{4}$$

yes

$$(2) f(x) = x^7$$

$$y = x^7$$

$$x = y^{\frac{1}{7}}$$

$$\sqrt[7]{x} = y$$

yes

$$(3) f(x) = 5x^3 + 1$$

$$y = 5x^3 + 1$$

$$x = \sqrt[3]{\frac{y-1}{5}}$$

~~$$1 = 5y^3$$~~

~~$$\frac{x-1}{5} = y^3$$~~

$$\sqrt[3]{\frac{x-1}{5}} = y$$

$$f^{-1}(x) = \sqrt[3]{\frac{x-1}{5}}$$

yes

$$y = b^x$$

$y =$ solution
 $b =$ base
 $x =$ exponent

$$\log_b y = x$$

$y =$ solution
 $b =$ base
 $x =$ exponent

Logarithms functions as inverses

$$2^3 = 8$$

$$8^3 = 2^{3(3)} = 2^9$$

Write each equation in logarithmic form.

$$1) 9^2 = 81$$

$$(2) 8^3 = 512$$

$$(3) 2^9 = 512$$

$$(4) 5^4 = 625$$

$$\log_9 81 = 2$$

$$\log_8 512 = 3$$

$$\log_2 512 = 9$$

$$\log_5 625 = 4$$

Evaluate each logarithm.

$$5) \log_2 128$$

$$\log_2 128 = x$$

$$2^x = 128$$

$$2^x = 2^7$$

$$x = 7$$

$$9 = 3^2$$

$$6) \log_9 27 = x$$

$$9^x = 27$$

$$\cancel{3}^{2x} = \cancel{3}^3$$

$$2x = 3$$

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

If no base is given, assume base is 10
In 2004, an earthquake of magnitude 7.0 shook Papua, Indonesia. Compare the intensity level of that earthquake to the intensity level of each earthquake below.

$$\log \frac{I_2}{I_1} = M_2 - M_1$$

I = intensity level
M = Magnitude

$$\frac{I_2}{I_1} = 10^{7.8-6.1} = 10^{1.7} = 50.12$$

7) magnitude 6.1 in Costa Rica, in 2009

$$\log \frac{I_2}{I_1} = 7 - 6.1$$

$$\frac{I_2}{I_1} = 10^{0.9} = 7.94$$

The Indonesia earthquake is 7.94 times more intense than Costa Rica

8) magnitude 7.8 in the Fiji Islands, in 2007

$$\log \frac{I_2}{I_1} = 7.8 - 7$$

$$\frac{I_2}{I_1} = 10^{0.8} = 6.31$$

Fiji earthquake is 6.31 times more intense than Indonesia

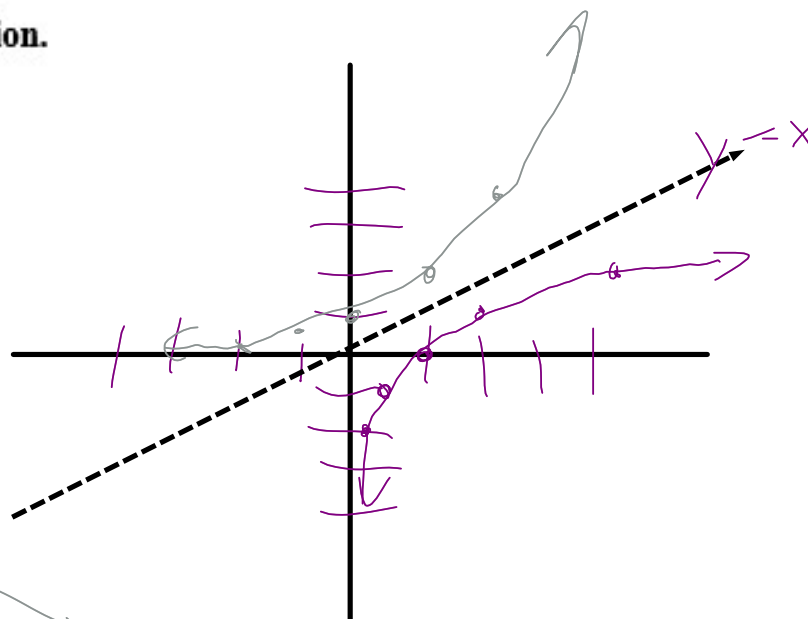
Graph each logarithmic function.

9) $\log_2 x$

$\log_2 x = y$

$2^y = x$

x	y
1/4	-2
1/2	-1
1	0
2	1
4	2



Inverse $y = 2^x$

x	-2	-1	0	1	2
y	1/4	1/2	1	2	4

Describe how the graph of each function compares with the graph of the parent function, $y = \log_3 x$.

$y = \log_3 x$
I) $y = \log_3 x - 2$
down 2

II) $y = \log_3(x+1) - 5$
left 1
down 5

Write each equation in exponential form.

$$12) \log_4 256 = 4 \quad 4^4 = 256$$

$$13) \log_2 32 = 5 \quad 2^5 = 32$$

$$14) \log_5 5 = 1 \quad 5^1 = 5$$

$$15) \log_9 59,049 = 5 \quad 9^5 = 59,049$$

$$16) \log_{36} 1 = 0 \quad 36^0 = 1$$

Find the inverse of each function.

$$17) y = \log_2 x$$

$$2^y = x$$

$$2^x = y$$

$$(18) y = \log_{100} x$$

$$100^y = x$$

$$100^x = y$$

$$(19) y = \log_2(4x)$$

$$\frac{2^y}{4} = \frac{4x}{4}$$

$$\frac{2^x}{4} = y$$

$$\frac{2^x}{2^2} = y$$

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

