

Lesson 56 Objective: SWBAT find the inverse of exponential functions.

Kickoff- Solve, graph and write interval notation.

$$1 + \frac{2}{x+1} \leq \frac{2}{x}$$

$x(x+1) \cdot \frac{2}{x+1} \leq \frac{2}{x} \cdot x(x+1)$ C.P.
 $1 + \frac{2}{x+1} = \frac{2}{x}$ $x = -1$
 $x = 0$

$$x^2 + x + 2x = 2x + 2$$

$$x^2 + 3x = 2x + 2$$

$$x^2 + x - 2 = 0$$

$$(x+2)(x-1) = 0$$

$$x = -2 \quad x = 1$$

Interval notation: $[-2, -1) \cup (0, 1]$

Try this: Find the inverse of $f(x) = x + 4$

$x = y + 4$
 $-4 = y - 4$
 $x - 4 = y$

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

Remember: The inverse is a reflection of the line $y = x$

Rule: $(x, y) \rightarrow (y, x)$

Rule: **Switch x and y!**

Graph: $f(x) = 2^x$ and $y = x$ on the axes below.

Now: Reflect $y = 2^x$ over $y = x$

$f(x) = 2^x$

x	y
-1	.5
0	1
1	2
2	4
3	8

*****we don't like things in x= form we like things in y= form*****

$$x = 2^y \rightarrow \log_2 x = y$$

Rule: **Log always = Exponent.**

$$\text{Base}^{\text{Exponent}} = \text{Answer} \rightarrow$$

$\text{LOG} \frac{\text{Answer}}{\text{Base}} = \text{Exponent}$

What is the inverse of $y = e^x$?

\ln (natural log)

Therefore: $x = e^y \rightarrow$

$$\boxed{\text{Log}_e} x = y$$

$$\downarrow$$

$$\ln x = y$$

Rewrite the inverse to log form:

1) $b = 12^a$ $\log_{12} b = a$

2) $4^{\frac{1}{2}} = 2$ $\log_4 2 = \frac{1}{2}$

3) $x = 5^3$ $\log_5 x = 3$

4) $16 = x^2$ $\log_x 16 = 2$

Rewrite the log in exponential form:

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

6) $\log_3 27 = 3$ $3^3 = 27$

7) $\log_{10} \frac{1}{100} = -2$ $10^{-2} = \frac{1}{100}$

8) $\log_3 1 = 0$ $3^0 = 1$

Solve for the variable: Rewrite in exponential form

9) $\log_7 x = 0$

$$7^0 = x$$
$$1 = x$$

11) $\log_8 32 = x$

$$8^x = 32$$
$$(2^3)^x = 2^5$$
$$3x = 5$$
$$x = \frac{5}{3}$$

10) $\log_{81} x = \frac{1}{2}$

$$81^{\frac{1}{2}} = x$$
$$\sqrt{81} = 9 = x$$

12) $\log_x 125 = 3$

$$x^3 = 125$$
$$x^3 = 5^3$$
$$x = 5$$