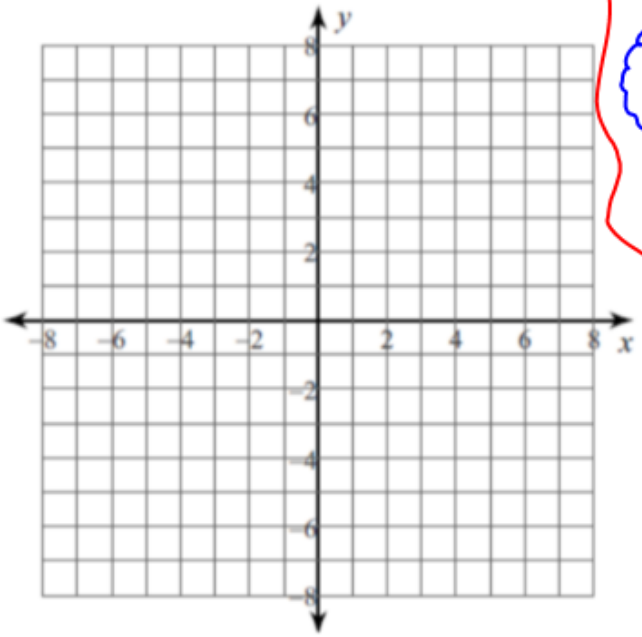
Warm Up

$y = 2^x$

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



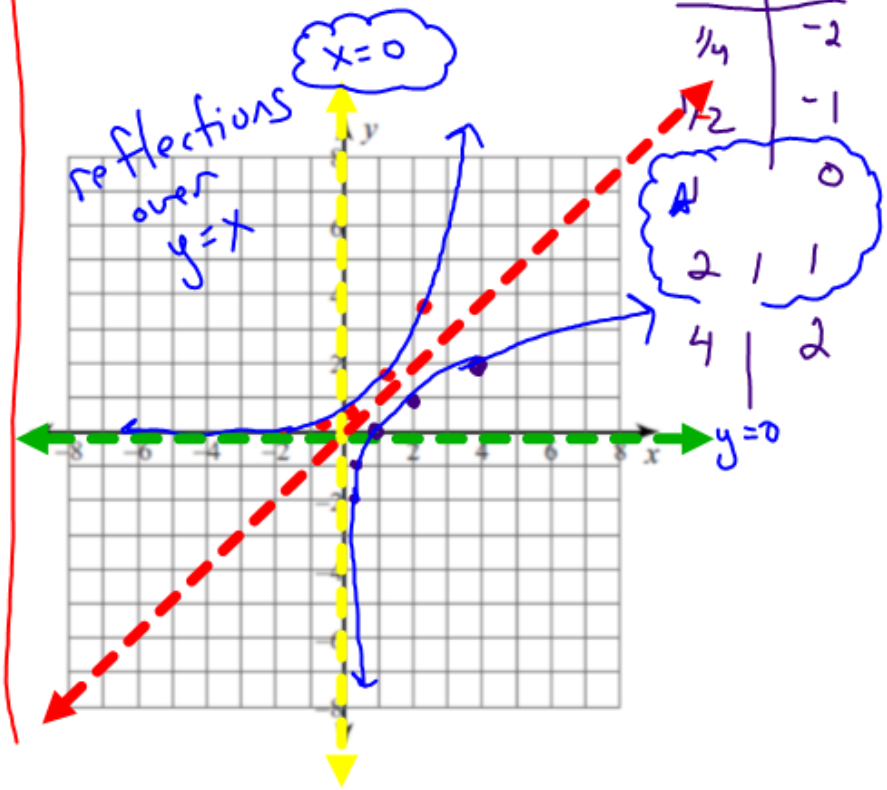
Graph each of the functions below:

$y = log_2 x$

$y = \log_4 x$

x	y
1	0
4	1

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



Do you remember how an exponential and a logarithmic function are related?

Inverses of each other!

Logarithms are just inverses of exponential functions.

What does that mean?

- "opposites"
- reflections over line $y = x$
- x & y switch
  - input becomes output & vice versa

Finding the inverse of an exponential function.

1) Switch the input and output, x and y, variables.

2) Isolate the exponential expression

3) Convert to a logarithmic expression

4) Isolate y

Example:

$(y) = (4)^{(x)}$

$x = 4^{y}$

$\star \quad \log_4 x = y \quad \star$

Find inverse

$y = \log_4 x$

$y = \log_4 (x-1)$

[Right 1]

Example:

$(y) = (4)^{(x)} + 1$

$y = 4^x$

$y = 4^x + 1$

[up 1]

$x = 4^y + 1$

$-1 \qquad -1$

$x - 1 = 4^y$

$\log_4 (x-1) = y$

$y = 4^{x-2} + 3$ up 3 right 2

Example:

$$y = (4)^{x+1}$$

$y = 4^x$

$y = 4^{x+1}$

[Left 1]

$$x = (4)^{(y+1)}$$

$$\log_4 x = y + 1$$

$\log_4(x) - 1 = y$

[down 1]

$\log_4(x - 1)$

Example:

Left 1

$y = (4)^{x+1} - 2$ down 2

$x = (4)^{y+1} - 2$

$x + 2 = (4)^{y+1}$

$\log_4(x+2) = y+1$

Left 2 down 1

$y = \log_4(x+2) - 1$

Example:

$$y = (5)^{x+2} + 3$$

Left 2 up 3

$y = 5^x$

$y = \log_5(x-3) - 2$

Right 3 down 2

$y = \log_5 x$

Practice with Inverses