Logarithms and inverse functions
1.30.17
23.1,23.2

Find the inverse of a function

To find the inverse function, swap the x and y and solve for y.

I do:
Find the inverse function of
$$y = 2x + 3$$

Original Function	$y = 2x + 3$
Swap "x" and "y"	
Solve for y	

We Do:

Find the inverse function of

$$y = \frac{1}{3}x - 10$$

Original Function	$y = \frac{1}{3}x - 10$
Swap "x" and "y"	
Solve for y	

Find the inverse function of
$$y = \frac{x - 3}{2}$$

Original Function	
Swap "x" and "y"	
Solve for y	

You do:
Left Talk, Right Write
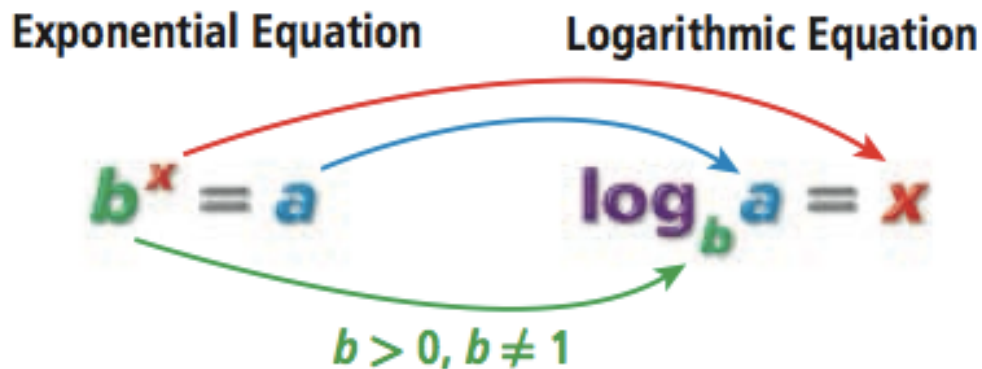On your Whiteboards with your partner

1) Find the inverse function of
$$y = \frac{2x - 3}{4}$$

2) Find the inverse function of
$$y = 4(x + 1)$$

A ***Logarithm*** is the exponent to which a specified base is raised to obtain a given value.

Exponential Equation   **Logarithmic Equation**

$$b^x = a \qquad \log_b a = x$$

$$b > 0, b \neq 1$$

Examples

$$2^3 = 8 \qquad \log_2 8 = 3$$
$$5^4 = 625 \qquad \log_5 625 = 4$$

Exponential   Logarithmic

We Try:
Write each exponential equation in logarithmic form.

1) $4^3 = 64$

2) $3^4 = 81$

3) $2^5 = 32$

You Try with your partner on the whiteboards:
1) $5^2 = 25$
2) $3^3 = 27$

Exponential Equation   **Logarithmic Equation**

$$b^x = a \qquad\qquad \log_b a = x$$

$$b > 0,\ b \neq 1$$

Write each logarithmic equation in exponential form

We Try:
1) $\log_7 343 = 3$

2) $\log_4 64 = 3$

$\log_4 4^3 = 3$

You Try with your partners on whiteboards:
1) $\log_4 16 = 2$
2) $log_2 1 = 0$

Special Properties of Logarithms

For any base b such that $b > 0$ and $b \neq 1$,

LOGARITHMIC FORM	EXPONENTIAL FORM	EXAMPLE
Logarithm of Base b		
$\log_b b = 1$	$b^1 = b$	$\log_{10} 10 = 1$ $10^1 = 10$
Logarithm of 1		
$\log_b 1 = 0$	$b^0 = 1$	$\log_{10} 1 = 0$ $10^0 = 1$

A logarithm with base 10 is called a **_Common Logarithm._** If there is no base, you can assume it to be 10.

EXAMPLE: $log5 = \log_{10} 5$

I Try:

Evaluate by using mental math.

$\log_2 1$

Setup by solving for x	$\log_2 1 = x$
Write in exponential form	$2^x = 1$
Solve for x	$2^0 = 1, x = 0$

We Try:

Evaluate by using mental math.

1) $\log_6 36$

Setup by solving for x	
Write in exponential form	
Solve for x	

You Try with your partner on a whiteboard.
Odd Talk, Even Write
Evaluate by using mental math.
1) $\log_3 81$

2) $\log_4 4$

Please take out a piece of paper. Please put your name on it.

Diagnostic Quiz Exit Slip.

1) Evaluate

$$\log_4 64 = x$$

2) Find the inverse of
$$y = \frac{4x-2}{5}$$

3) Express as a single logarithm.
$$\log_8 4 + \log_8 16$$

4) Solve for x
$$8^x = 2^{x+6}$$

5) *Solve for x*
$$\log_3(x - 5) = 2$$