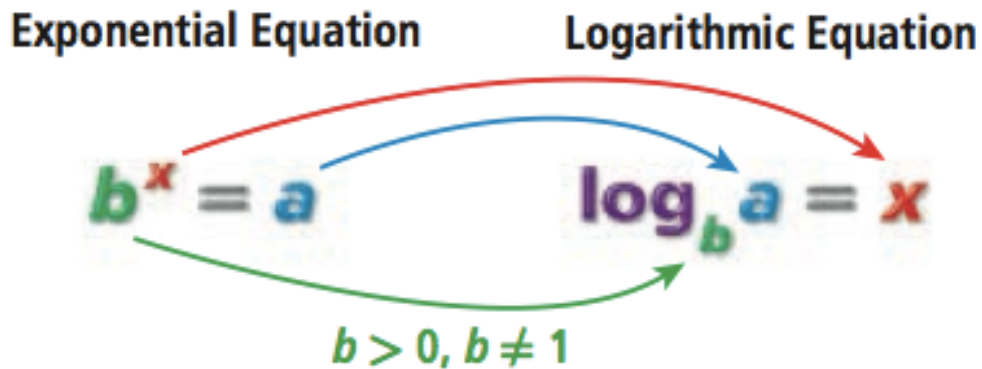


# Logarithms

## 7.3

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



### Examples

$$2^3 = 8$$

$$\log_2 8 = 3$$

$$5^4 = 625$$

$$\log_5 625 = 4$$

We Try:

Write each exponential equation in logarithmic form.

1)  $4^{1.5} = 8$

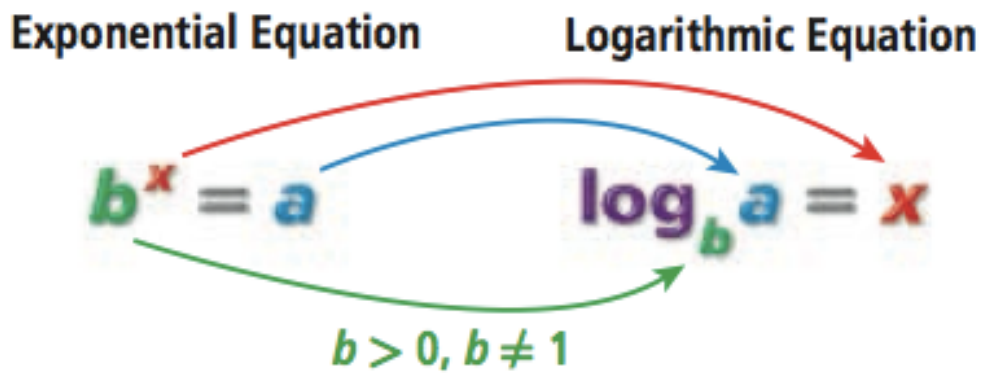
2)  $3^4 = 81$

$$3) 2^5 = 32$$

You Try with your partner on the whiteboards:

$$1) 5^2 = 25$$

$$2) 6^3 = 216$$



Write each logarithmic equation in exponential form.

$$\log_6 216 = x$$

$$6^x = 216$$

We Try:

1)  $\log_7 343 = 3$

2)  $\log_4 64 = 3$

You Try on whiteboards:

Odd Talk, Even Write

1)  $\log_4 .25 = -1$

2)  $\log_{2.5} 1 = 0$

### Special Properties of Logarithms

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

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

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

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

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.

$$1) \log_4 \frac{1}{4}$$

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.

$$1) \log_3 81$$

$$2) \log_4 4$$

Closure:

Discuss with your partner. Be ready to share with the class.

What were 3 things we learned today.

Please take out a piece of paper. Please put your name on it.  
Diagnostic Assessment/Exit Slip.

1) Evaluate

$$\log_4 64 =$$

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*

$$\log_3(x - 5) = 2$$