Algebra 3-4
Unit 3 Day 3

Name: _____ Per: _____
Date: _____

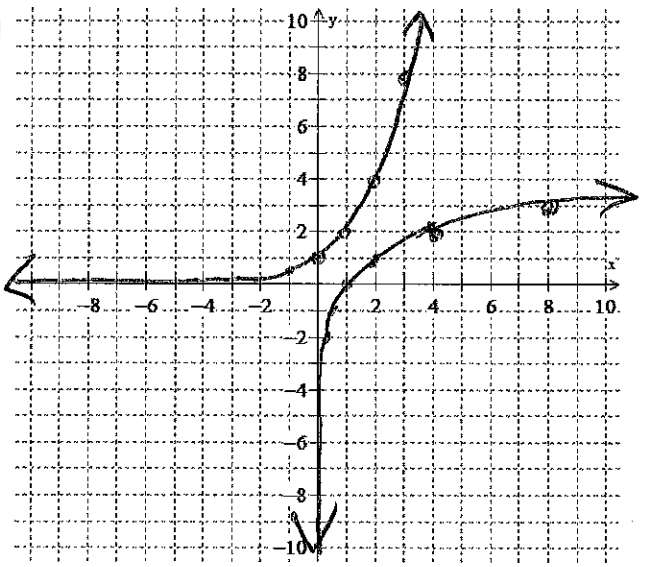
1) Carefully draw the graph of $y = 2^x$, complete the table and list its features.

2) Use your knowledge of inverses to graph the inverse in a different color.

$y = 2^x$

x-intercept: None
y-intercept: 0, 1
Domain: $(-\infty, \infty)$
Range: $(0, \infty)$
Asymptotes: $y = 0$

x	y
-2	1/4
-1	1/2
0	1
1	2
2	4
3	8



inverse

x-intercept: (1, 0)
y-intercept: None
Domain: $(0, \infty)$
Range: $(-\infty, \infty)$
Asymptotes: $y = 0$

x	y
1/4	-2
1/2	-1
1	0
2	1
4	2
8	3

3) Why are all the y-values on the graph of $y = 2^x$ positive?

Because multiplying/dividing by 2 will never give a negative #.

How does this impact the graph of the inverse $y = 2^x$?

The x values of the inverse will never be negative.

4) For $y = 2^x$ find as many missing x-values as you can in the table below.

x	3	5	-1	0	4	2		6	1		-2		7	
y	8	32	½	1	16	4	3	64	2	0	¼	-1	128	39

a) Describe your thinking.

What power of 2 gives each y value.

b) Which x-values are impossible to find? Why?

Can't get 0 or negatives (see question 3)

c) Which x-values are difficult to find? Why?

3 & 39 because 2 doesn't go into odd numbers

5) Using the following clues, find the missing pieces of the puzzles below. Explain how your answers make sense.

CLUES

$\log_2 8 = 3$ $\log_3 27 = 3$ $\log_5 25 = 2$ $\log_{10} 10000 = 4$

PUZZLES

a) $\log_2 16 = ?$ 4

b) $\log_2 64 = ?$ 6

c) $\log_? 100 = 2$ 10

d) $\log_5 ? = 3$ 125

e) $\log_? 81 = 4$ 3

f) $\log_{100} 10 = ?$ 1/2

6) Logarithms are the inverse functions of exponential functions. So, every exponential equation can be re-written in its logarithmic form and every logarithmic equation can be rewritten in its exponential form. For example,

Exponent ↓ exponent ↓

$4^3 = 64$ is equivalent to $3 = \log_4 64$

↑ Base ↑ base

We read the second equation as: "The log base 4 of 64 is 3."

Using this information complete this table:

Exponential form	Logarithmic Form
$y = 5^x$	$y = \log_5 x$
$y = 7^x$	$y = \log_7(x)$
$8^x = y$	$y = \log_8 x$
$A^K = C$	$K = \log_A C$
$A^K = C$	$K = \log_A(C)$
$(1/2)^N = K$	$\text{Log}_{1/2}(K) = N$

7) Write the equation for the inverse of $y = 2^x$. $y = \log_2 x$