We will explore the relationship between  $y = a^x$  and  $y = \log_a x$ .

1. Complete the table and graph  $y = 4^x$ .

$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	x  v = 4	x
-1	y = 4	
-1		
-1	2	60 +
-1	-2	
-1		
-1		
-1		50
1		
1	-1	
1 20 - 10 - 5 - 10 - 10 - 10 - 10 - 10 - 10		
1 20 - 10 - 5 - 10 - 10 - 10 - 10 - 10 - 10		
1 20 - 10 - 5 - 5 - 10 - 10 - 10 - 10 - 10		40 +
1 20 - 10 - 5 - 5 - 10 - 10 - 10 - 10 - 10		
1 20 - 10 - 5 - 5 - 10 - 10 - 10 - 10 - 10	0	
2	U	
2		30 +
2		
2		
2		
2	1	20-
2 5 - 5 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 -		20
2 5 - 5 - 6 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7		
2 5 - 5 - 6 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7		
2 5 5		
5	2	10 + 10
	2	
		5 +
3 -2 -1 1 2 3 4		
3		
3		
	3	-2 -1 1 2 0 4

2. The inverse of  $y = 4^x$  is  $y = \log_4 x$ . Switch the x and y values in your table and plot those points to graph  $y = \log_4 x$ .

x	$y = \log_4 x$	<b>1</b> 11111111111111111111111111111111111	
	-2		+
	-1	3	
	0	2	
	1	5 10 20 30 40 50 60	-4
	2	-1 <u>5 10</u> 20 30 40 50 60 -2	
	3		$\prod$
	3	1	

- 3a.) In words, what is  $\log_4 64$ ?
- 3b). What is the numerical value of  $\log_4 64$ ?
- 3c.) How is this information (from questions 3a and 3b) shown on the graph of  $y = \log_4 x$ ? On your graph, highlight the relevant point.

Complete the sentence: When *x* is \_\_\_\_\_\_, *y* is \_\_\_\_\_\_.

3d.) How is this information (from questions 3a and 3b) shown on the graph of  $y = 4^x$ ? On your graph, highlight the relevant point. Complete the sentence: When x is \_\_\_\_\_\_, y is \_\_\_\_\_.