STUDENT NAME: _____

TEACHER NAME: MADARANG

SUBJECT: ALGEBRA 2

PERIOD: _____

WEEK: 1

LESSON 15-1

Defining and Evaluating a Logarithmic Function

Practice and Problem Solving: Modified

Write each exponential equation in logarithmic form. The first one is done for you.

1. $7^3 = 343$
   $\log_{base} 343 = \text{exponent}$
   $\log_7 343 =$ 3
2. $2^6 = 64$
   $\log_{base} 64 = \text{exponent}$
   $\log_2 64 =$ _____
3. $15^2 = 225$
   $\log_{base} 225 = \text{exponent}$
   $\log_{15} 225 =$ _____
4. $2^3 = 8$
   _____
5. $17^0 = 1$
   _____
6. $2^3 = \frac{1}{8}$
   _____
7. $4^5 = 1024$
   _____
8. $3^6 = 729$
   _____
9. $5^4 = 625$
   _____

Write each logarithmic equation in exponential form. The first one is done for you.

10. $\log_4 64 = 3$
    $4^3 = 64$
11. $\log_8 512 = 3$
    _____ $= 512$
12. $\log_6 36 = 2$
    _____ $= 36$
13. $\log_{10} 100 = 2$
    _____
14. $\log_5 125 = 3$
    _____
15. $\log_9 1 = 0$
    _____
16. $\log_2 128 = 7$
    _____
17. $\log_3 243 = 5$
    _____
18. $\log_{100} 1{,}000{,}000 = 3$
    _____

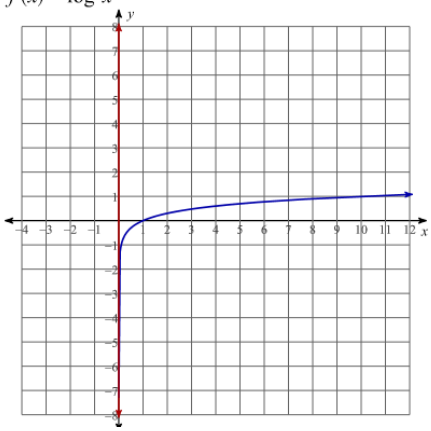
Solve for *x* without using a calculator. The first one is done for you.

19. $\log 10{,}000 = x$
    $10^x = 10{,}000$
    $10^x = 10^4$
    $x = 4$
20. $\log 100{,}000 = x$
    $10^x = 100{,}000$
    $10^x =$ _____
    $x =$ _____
21. $\log 1 = x$
    $10^x = 1$
    $10^x =$ _____
    $x =$ _____
22. $\log_2 16 = x$
    _____
23. $\log_4 1 = x$
    _____
24. $\log_9 81 = x$
    _____
25. $\log_{100} 100{,}000{,}000 = x$
    _____
26. $\log 1{,}000{,}000{,}000 = x$
    _____
27. $\log_3 81 = x$
    _____
28. $\log_4 64 = x$
    _____
29. $\log_5 25 = x$
    _____
30. $\log 1000 = x$
    _____

DISCUSSION: How to Graph Logarithmic Functions.

Step 1 Check the base of your problem. Identify the parent function first. (This graph is base 10. See other graphs below for base 4 and base 2)

1) $f(x) = \log x$



Asymptote: x = 0
Domain: x > 0
Range: All real nos.

Table for the parent function:

x	*y*
100	*2*
10	*1*
1	*0*
$\frac{1}{10}$ *or* *0.1*	*-1*
$\frac{1}{100}$ *or* *0.01*	*-2*

Step 2 Identify and draw the vertical asymptote.
Vertical Asymptote: *x = h*

Step 3 Identify a, b, h, k and describe the transformation.

Step 4 Make a table of values. Use your calculator to find the values.

bx+h,	*ay+k*

Step 5: Plot the points on the graph.
Write down the asymptote, domain and range.

$f(x) = \log_4 x$

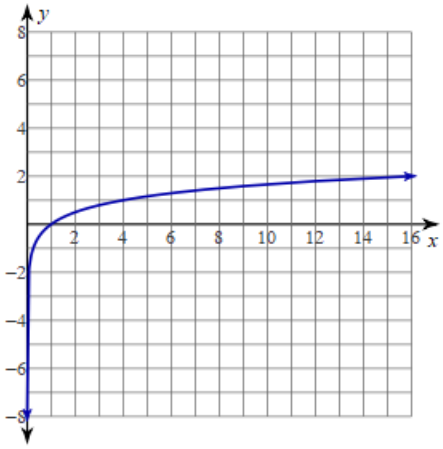


Table for parent function, base 4

x	*y*
$4^2 = 16$	*2*
$4^1 = 4$	*1*
$4^0=1$	*0*
$\frac{1}{4}$ *or* *0.25*	*-1*
$\frac{1}{16}$ *or* *0.0625*	*-2*

$f(x) = \log_2 x$

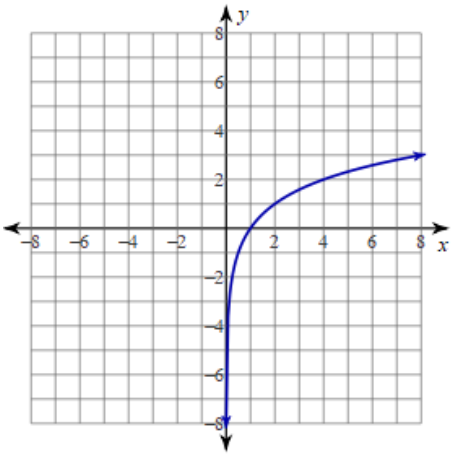


Table for parent function, base 2

x	*y*
$2^2 = 4$	*2*
$2^1 = 2$	*1*
$2^0 = 1$	*0*
$\frac{1}{2}$ *or* *0.5*	*-1*
$\frac{1}{4}$ *or* *0.25*	*-2*

GRAPHS OF LOGARITHMIC FUNCTIONS EXERCISE: # 1 is being done for you.

1. $f(x) = -\log_4(x+2)$

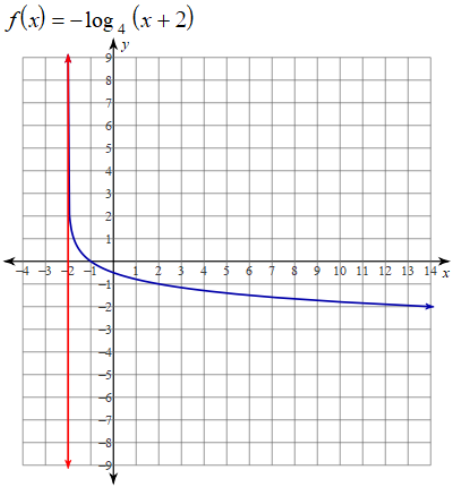
a = 1, h = -2, k = 0

transformation: reflection across the x axis

shift 2 units to the left

Table for base 4 **New table**

x	*y*	*bx + h* *x - 2*	*ay + k* *-y + 0*
16	*2*	*16 – 2 = 14*	*-2*
4	*1*	*4 – 2 = 2*	*-1*
1	*0*	*1 – 2 = -1*	*0*
0.25	*-1*	*0.25 – 2 = -1.75*	*1*
0.0625	*-2*	*0.0625 – 2 = -1.9375*	*2*



Asymptote: x = -2 Domain: x > -2 Range: all real #s

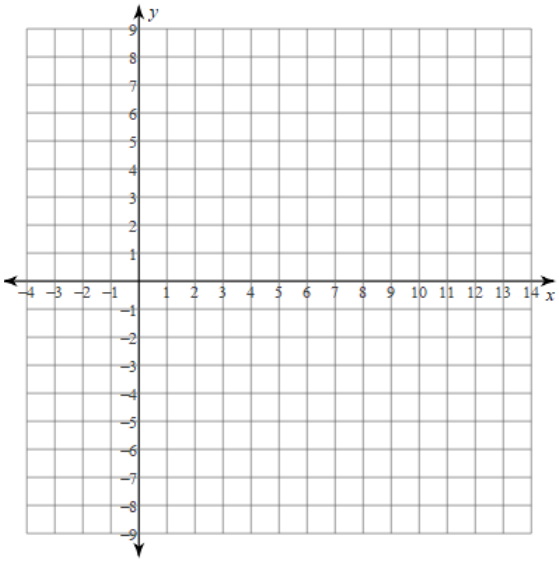
2. $f(x) = \log_4 x + 3$

a = h = k =

transformation:

Table for base 4 **New table**

x	*y*	*bx + h*	*ay + k*



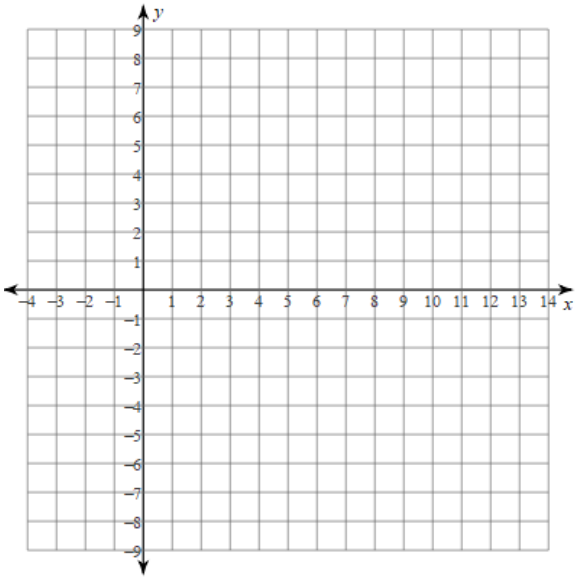
3. $f(x) = \log_2(x-3)$

a = h = k =

transformation:

Table for base 2 **New table**

x	*y*	*bx + h*	*ay + k*



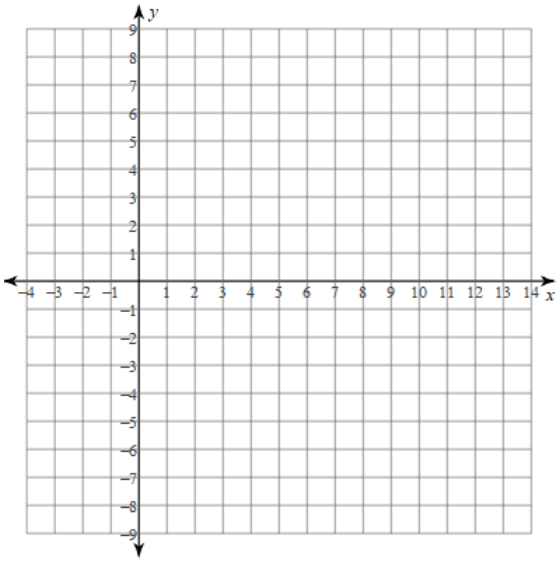
4. $f(x) = 2\log_2(x+1) - 2$

a = **h =** **k =**

transformation:

Table for base 2 **New table**

x	*y*	*bx + h*	*ay + k*



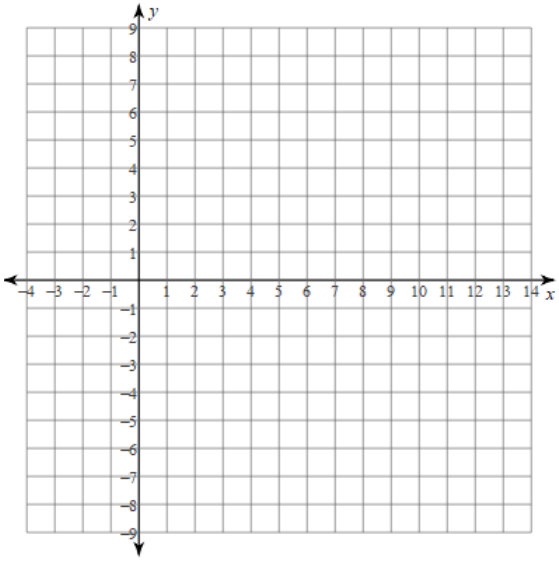
5. $f(x) = (\frac{1}{2})\log_4(x) + 4$

a = **h =** **k =**

transformation:

Table for base 4 **New table**

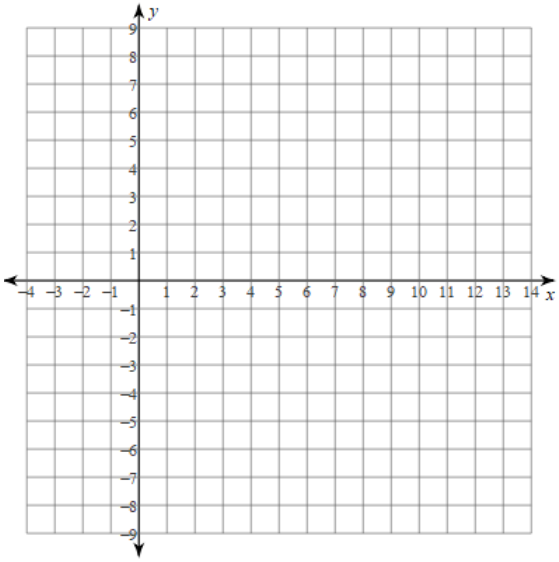
x	*y*	*bx + h*	*ay + k*



6. $f(x) = \log(x) + 3$

a = **h =** **k =**

transformation:

Table for base 10 **New table**

x	*y*	*bx + h*	*ay + k*