Algebra 2
Notes and Examples Day 2
Section 7.3 Logarithmic Functions

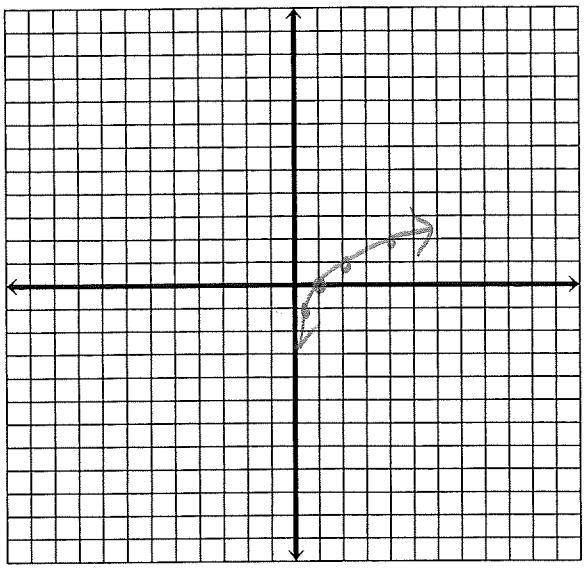
Name _____

Hour _____ Date _____

1. Graph $y = \log_2 x$

$y = \log_2 x$ $\quad 2^y = x$

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



Domain $x > 0$

Range arn

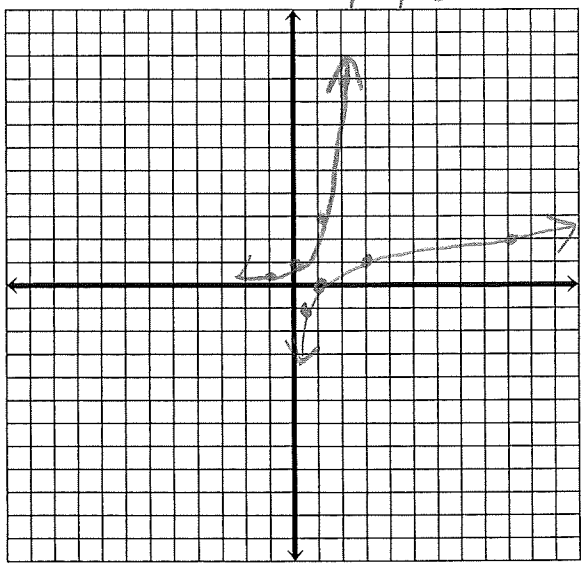
2. Graph $y = 3^x$ and $y = \log_3 x$ on the same grid.

$y = 3^x \longleftrightarrow y = \log_3 x$ $\quad 3^y = x$

x	y
-1	1/3
0	1
1	3
2	9

x	y
1/3	-1
1	0
3	1
9	2

d: arn
r: $y > 0$



d: $x > 0$
r: arn

Exponential functions and logarithmic functions are inverses of each other.

Their graphs are a reflection across the line $y = x$.

Fill in the table below which summarizes the relationship between the domain and range of $y = 3^x$ and $y = \log_3 x$

Function	Domain	Range
$y = 3^x$	ARN	$y > 0$
$y = \log_3 x$	$x > 0$	ARN

Take Note

Concept Summary Families of Logarithmic Functions

Parent function	$y = \log_b x, b > 0, b \neq 1$
Stretch ($\lvert a \rvert > 1$) Compression (shrink) ($0 < \lvert a \rvert < 1$) Reflection ($a < 0$) in x-axis	$y = a \log_b x$
Translations (horzontal by h; vertical by k)	$y = \log_b (x - h) + k$
All transformations together	$y = a \log_b (x - h) + k$

$y = 2^x + 3$

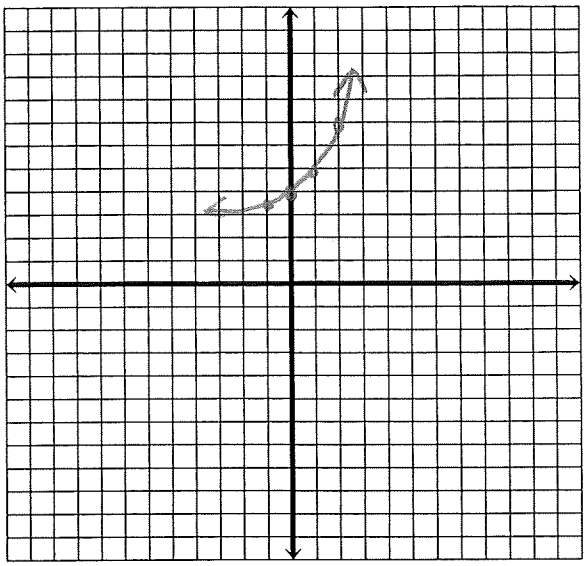
3. Graph $y = 2^{x} + 3$

$y = 2^x$

$y+3$

x	y	work	x	y
-1	1/2		-1	3 1/2
0	1		0	4
1	2		1	5
2	4		2	7

dom r: $y > 3$

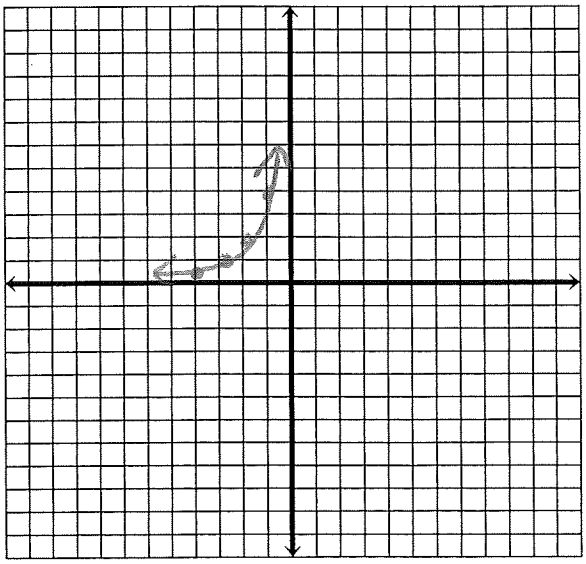


$x - 3$

4. Graph $y = 2^{x+3}$

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

dom $y > 0$



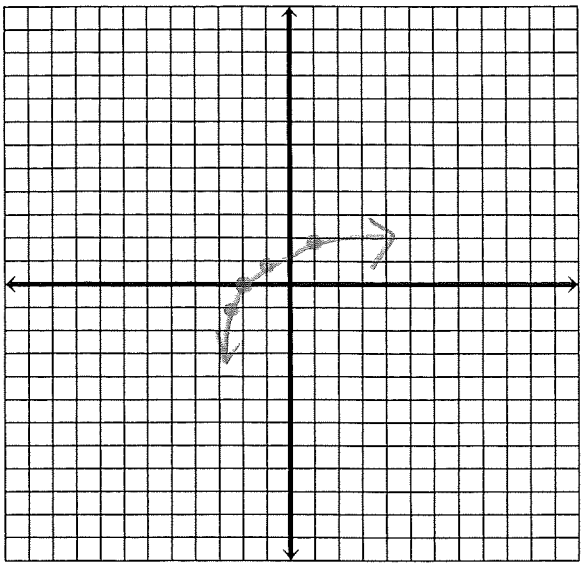
5. Graph $y = \log_2(x+3)$

$y = \log_2 x$

$2^y = x$

$x - 3$

x	y	work	x	y
1/2	-1		-2 1/2	-1
1	0		-2	0
2	1		-1	1
4	2		1	2



$x > -3$

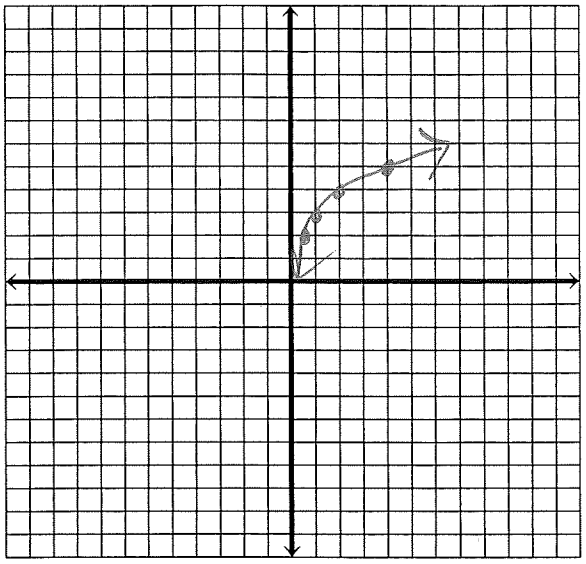
y arn

6. Graph $y = 3 + \log_2 x$

$y = \log_2 x + 3$

$y + 3$

x	y	work	x	y
1/2	-1		1/2	2
1	0		1	3
2	1		2	4
4	2		4	5



d: $x > 0$

r: arn

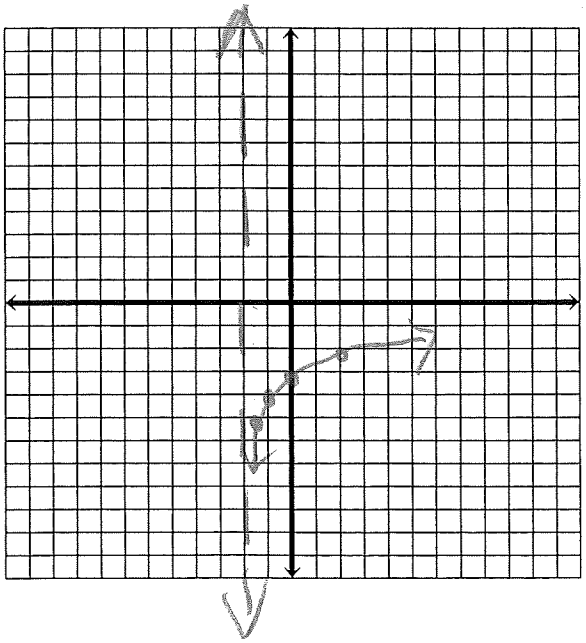
7. Graph $y = -4 + \log_2(x+2)$

$y = \log_2(x+2) - 4$

$x - 2$ $\quad y - 4$

x	y	work	x	y
1/2	-1		-1 1/2	-5
1	0		-1	-4
2	1		0	-3
4	2		2	-2

$x = -2$



d: $x > -2$

r: arn

Name _____ Class _____ Date _____

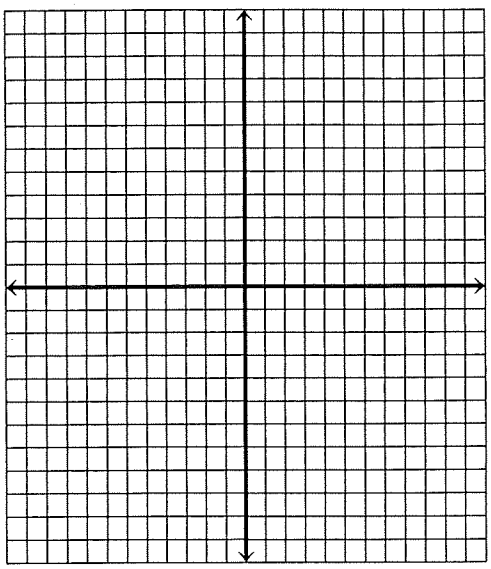
7-3 Practice

Form G

Logarithmic Functions as Inverses

Graph each logarithmic function.

21. $y = \log x$

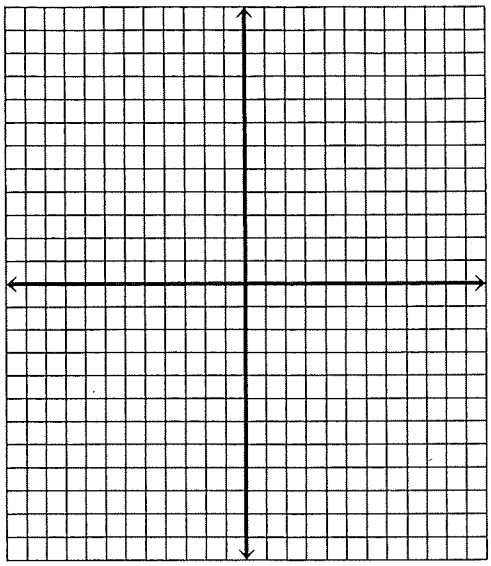


x	y

Domain _____

Range _____

22. $y = \log_3 x$

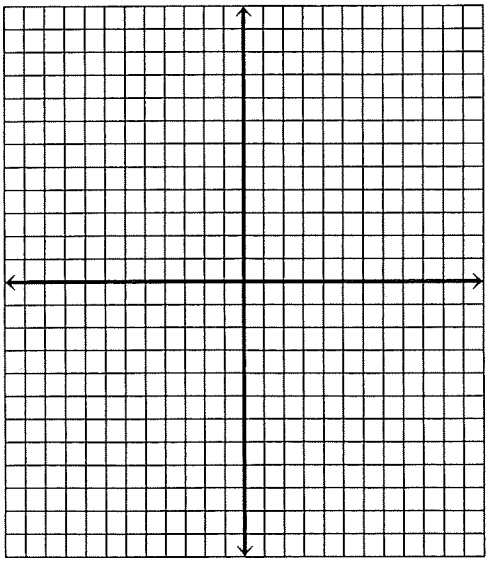


x	y

Domain _____

Range _____

23. $y = \log_6 x$

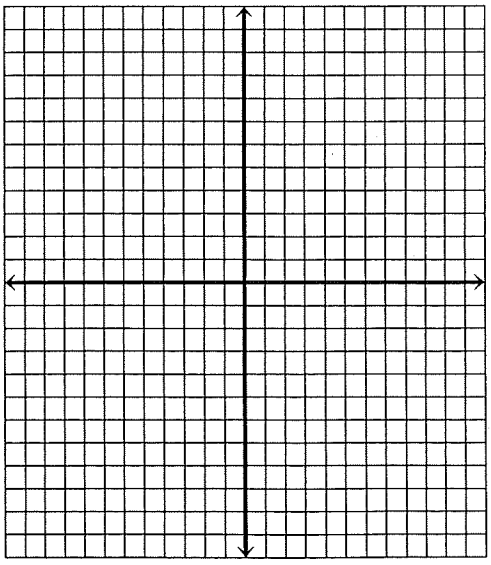


x	y

Domain _____

Range _____

24. $y = 2 + \log x$

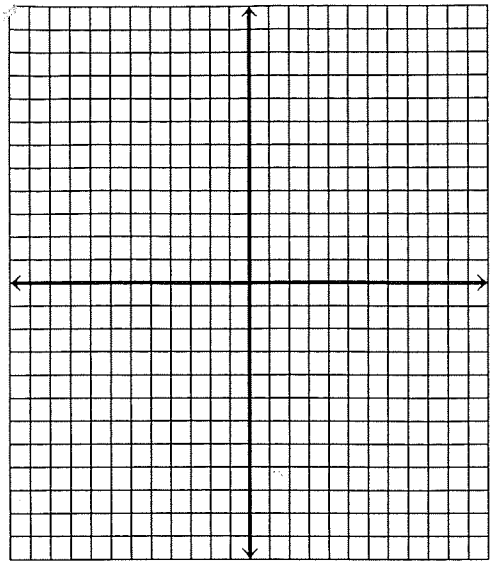


x	y

Domain _____

Range _____

25. $y = 3\log x - 1$ $y = 3\log_2 x - 1$

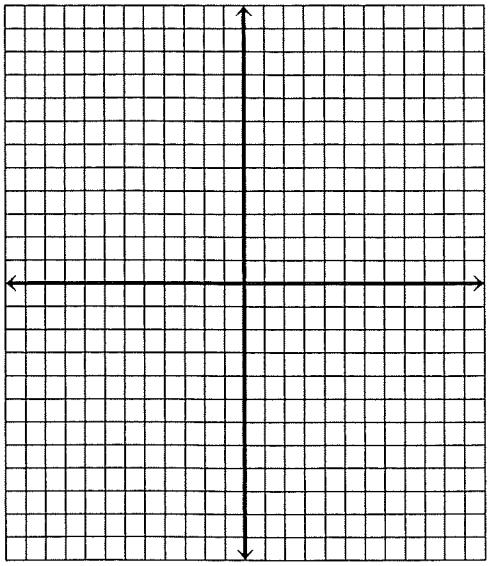


x	y

Domain _____

Range _____

26. $y = 2 - 4\log x$

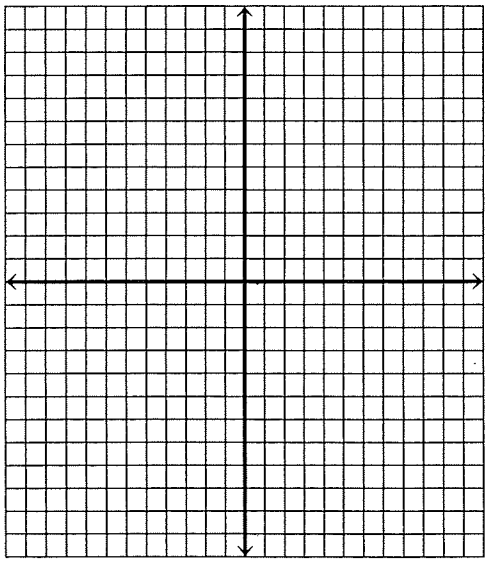


x	y

Domain _____

Range _____

25. $y = 2\log x + 2$

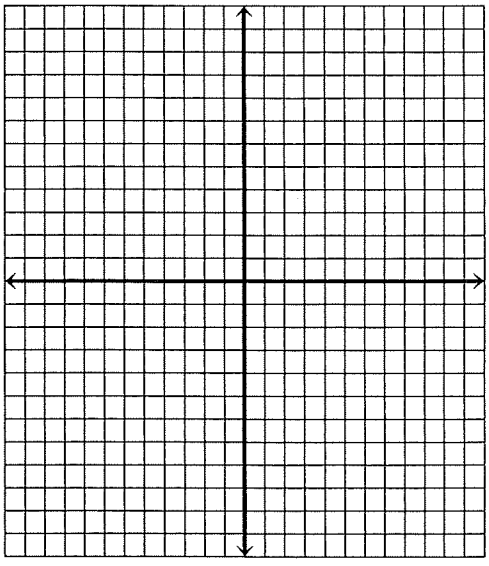


x	y

Domain _____

Range _____

26. $y = \log_2(x - 2)$



x	y

Domain _____

Range _____

Describe how the graph of each function compares with the graph of the parent function, $y = \log_b x$.

24. $y = \log_3 x - 2$ 2 down

26. $y = \log_6 (x + 1) - 5$ 1 left 5 down

27. $y = \log_2 (x - 4) + 1$ 4 right 1 up

40. $y = \log_5 x + 1$ 1 up

41. $y = \log_7 (x - 2)$ 2 right

42. $y = \log_3 (x - 5) + 3$ 5 right 3up

43. $y = \log_4 (x + 2) - 1$ 2 left 1 down

44. $y = 3\log x - 1$ Vertical stretch by 3, 1 down

45. $y = \frac{1}{2}\log x + 5$ V.C by 1/2 5 up

46. $y = -5\log(x - 6)$ r.0 x axis vs by 5, 6 right

47. $y = -4 + \frac{1}{3}\log(x + 4)$ v.c by 1/3, 4 left 4 down

$= \frac{1}{3}\log(x+4) - 4$