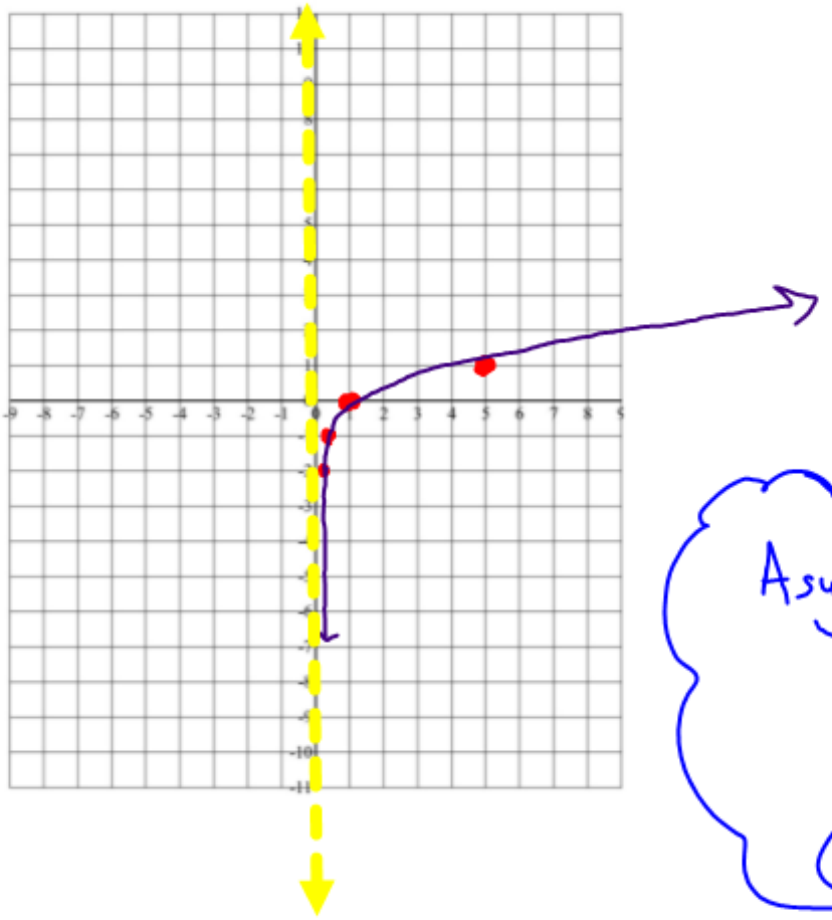
Warm Up

Graph the following function:

$$y = log_5 x$$

$5^y = x$

x	y
1/5	−1
1	0
5	1
1/25	−2



asymptote
x = 0

Asymptote
x = 0
(1, 0)
(base, 1)

$x = 0$

$(1, 0)$

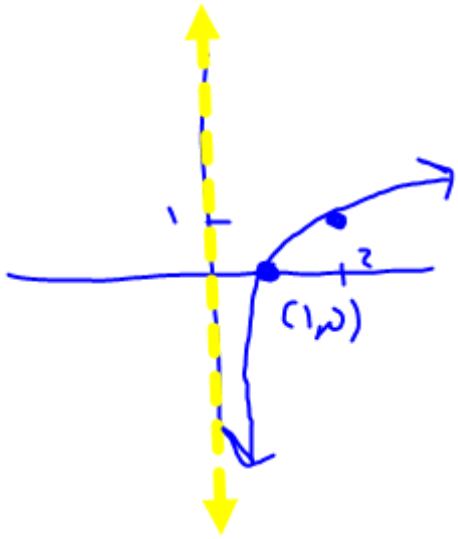
$(\text{base}, 1)$

$y = \log_2 x$

$x = 0$

$(1, 0)$

$(2, 1)$



Disclaimer: These rules only work if your equation is in the form, $y = a\log_b c(x-d) + e$

Transformation	Equation	Rule	Example
Vertical Shift	$y = \log_b x + e$	If e is positive: up If e is negative: down	$y = \log_2 x + 4$ up 4 $y = \log_2 x - 3$ down 3
Horizontal Shift	$y = \log_b(x+d)$	If d is positive: left If d is negative: right	$y = \log_2(x+5)$ left 5 $y = \log_2(x-3)$ right 3
Reflection over the x-axis	$y = -\log_b x$	If a is negative: reflect over x-axis	$y = -\log_2 x$ reflection

$y = -3\log_2 x$ reflection

$$y = \log_6(x)$$

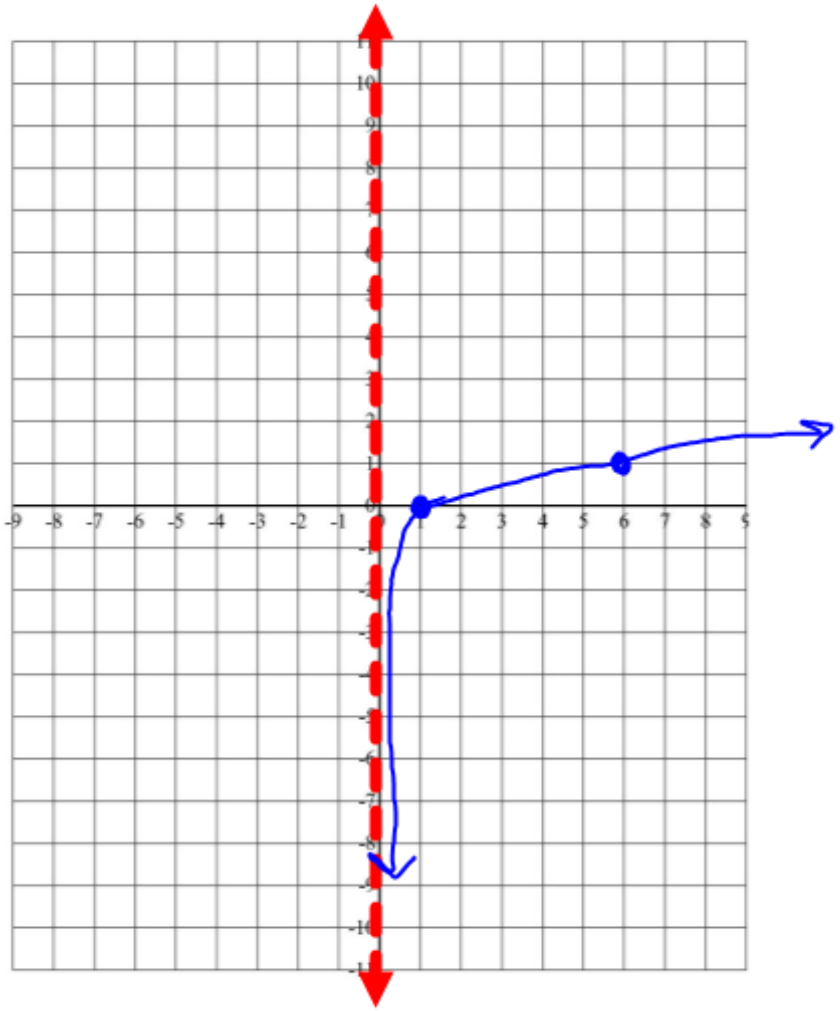
Asymptote: $x = 0$

$(1, 0)$

$(6, 1)$

$6^y = x$

x	y
1	0
6	1



$$y = log_6(x + 6)$$

start

$x = 0$

$(1, 0)$

$(6, 1)$

1-6

6-6

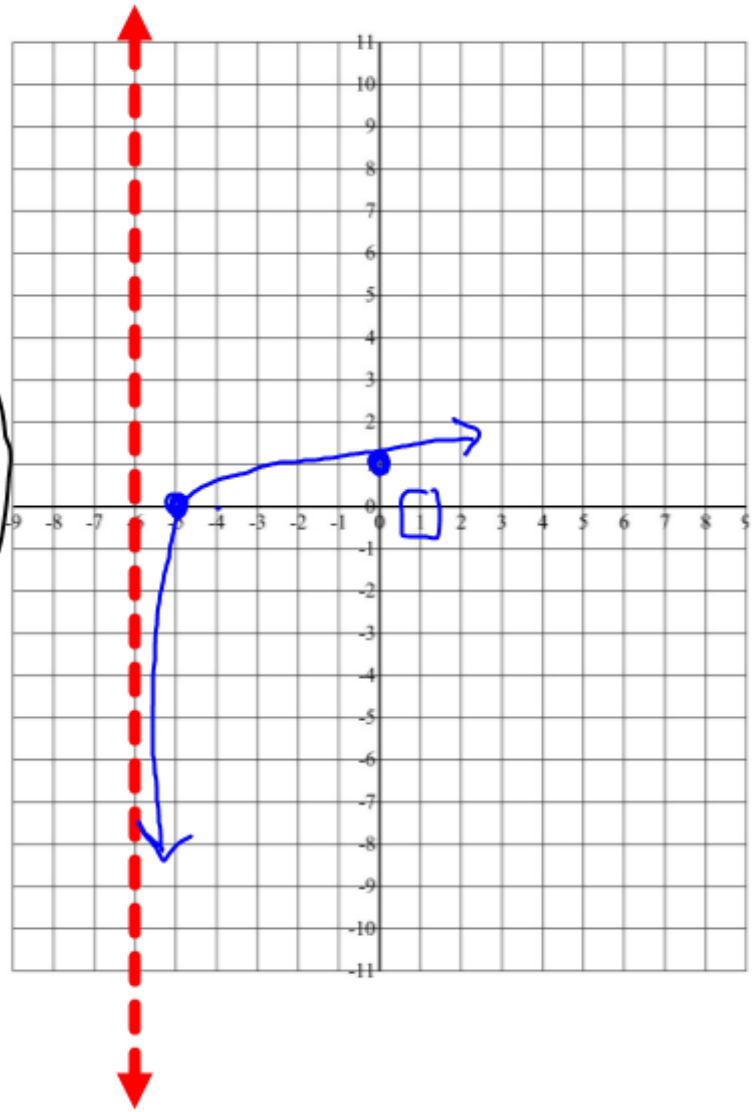
Left 6

$x = -6$

$(-5, 0)$

$(0, 1)$

horiz. changes the x value only



$$y = log_6(x) - 5$$

start

$x = 0$

$(1, 0)$

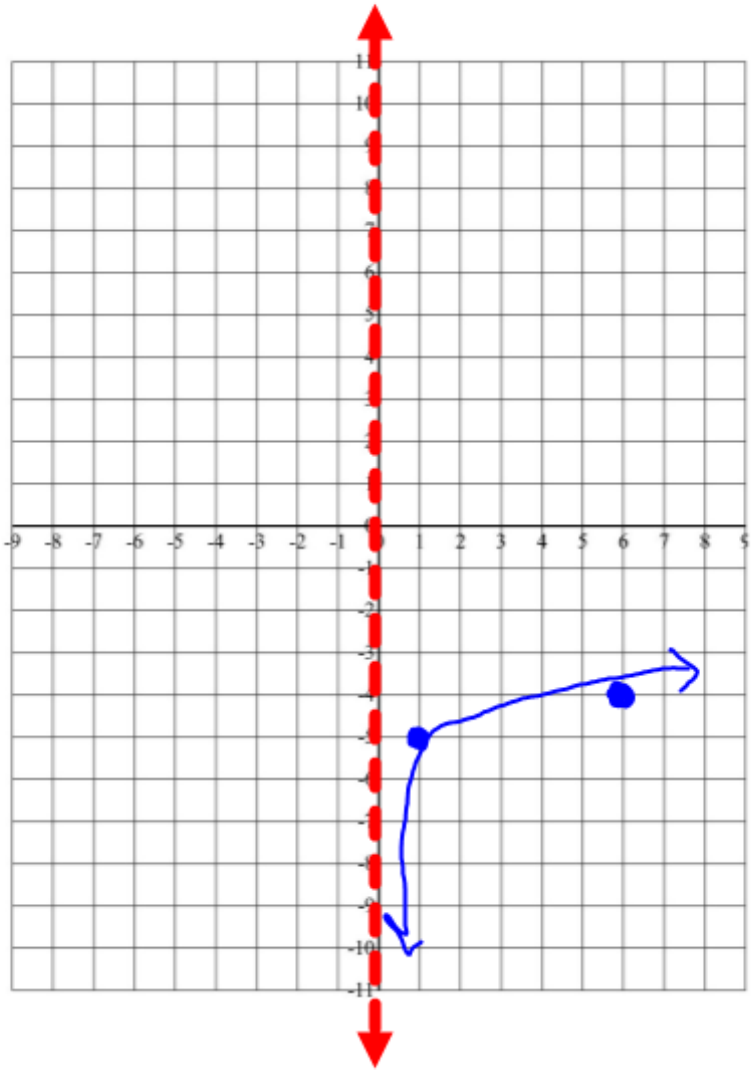
$(6, 1)$

down 5

$X = 0$

$(1, -5)$

$(6, -4)$



vertical only

changes y value

$$y = 2\log_6(x)$$

start

$x = 0$

$(1,0)$

end

$x = 0$

$(1,0)$

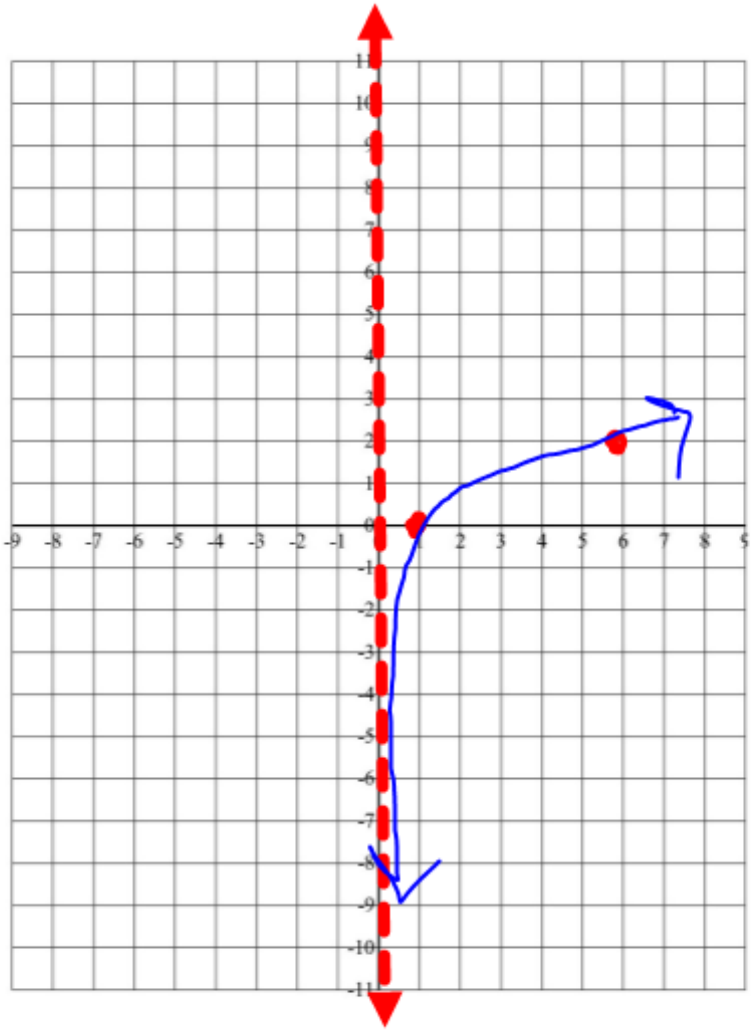
$0 \cdot 2$

$(6,1)$

$1 \cdot 2$

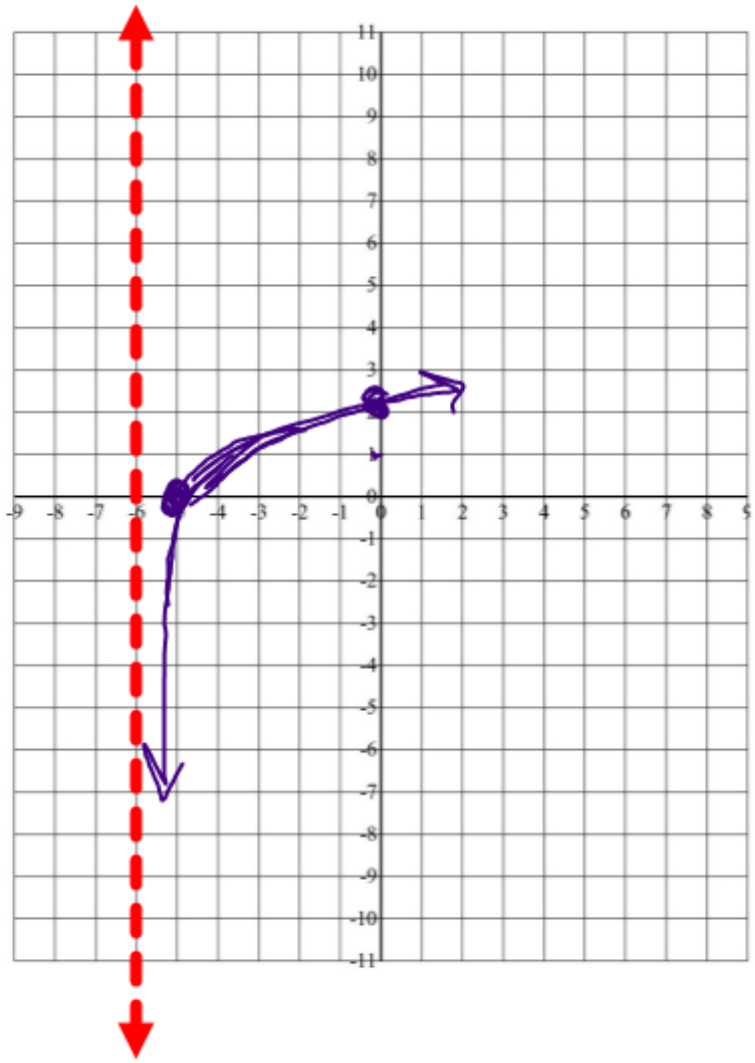
$(6,2)$

stretch multiplies the y-coordinate



$$y = 2\log_6(x+6)$$

Start	Horiz. Left 6	Stretch mult. "y" by 2
$x = 0$	$x = -6$	$x = -6$
$(1, 0)$	$(-5, 0)$	$(-5, 0)$
$(6, 1)$	$(0, 1)$	$(0, 2)$



1st: Horizontal

2nd: Stretch/Reflection

3rd: Vertical

$$y = \log_6(x+6) - 5$$

$x = 0$

$(1,0)$

$(6,1)$

Left 6

$x = -6$

$(-5,0)$

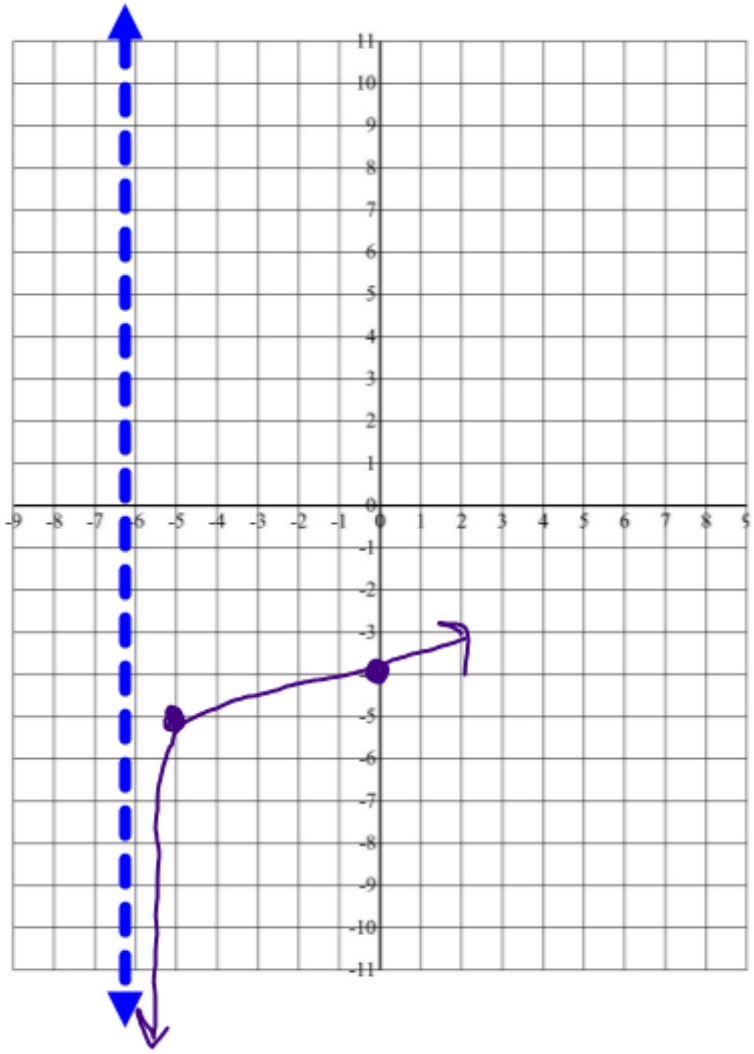
$(0,1)$

Down 5

$x = -6$

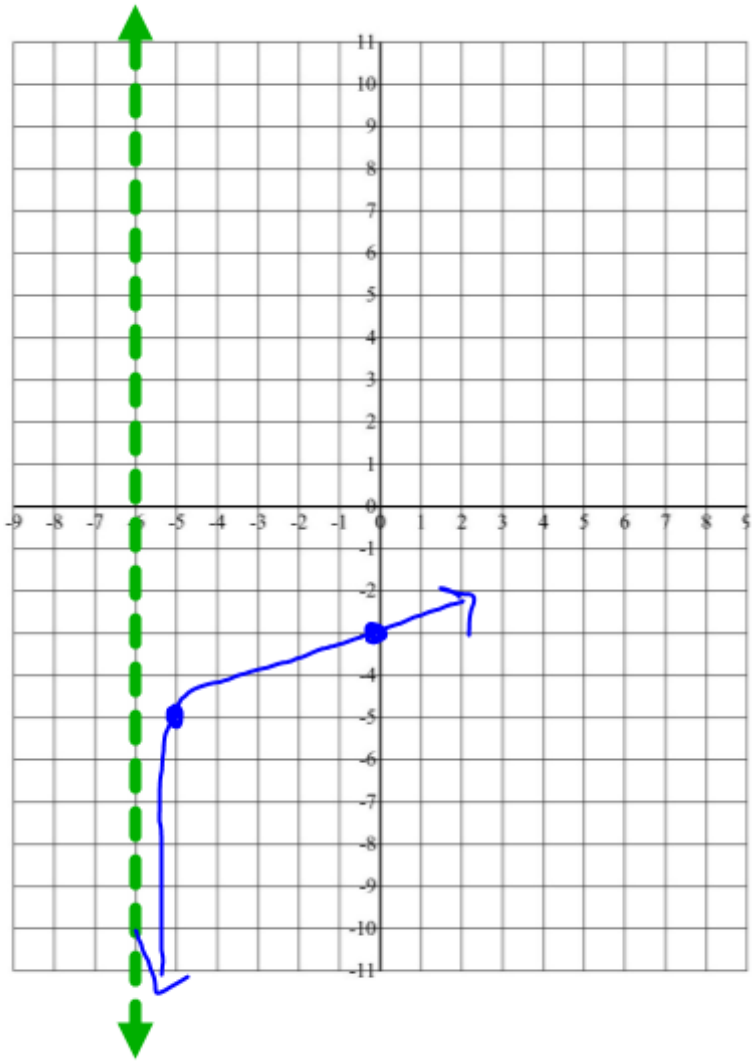
$(-5,-5)$

$(0,-4)$



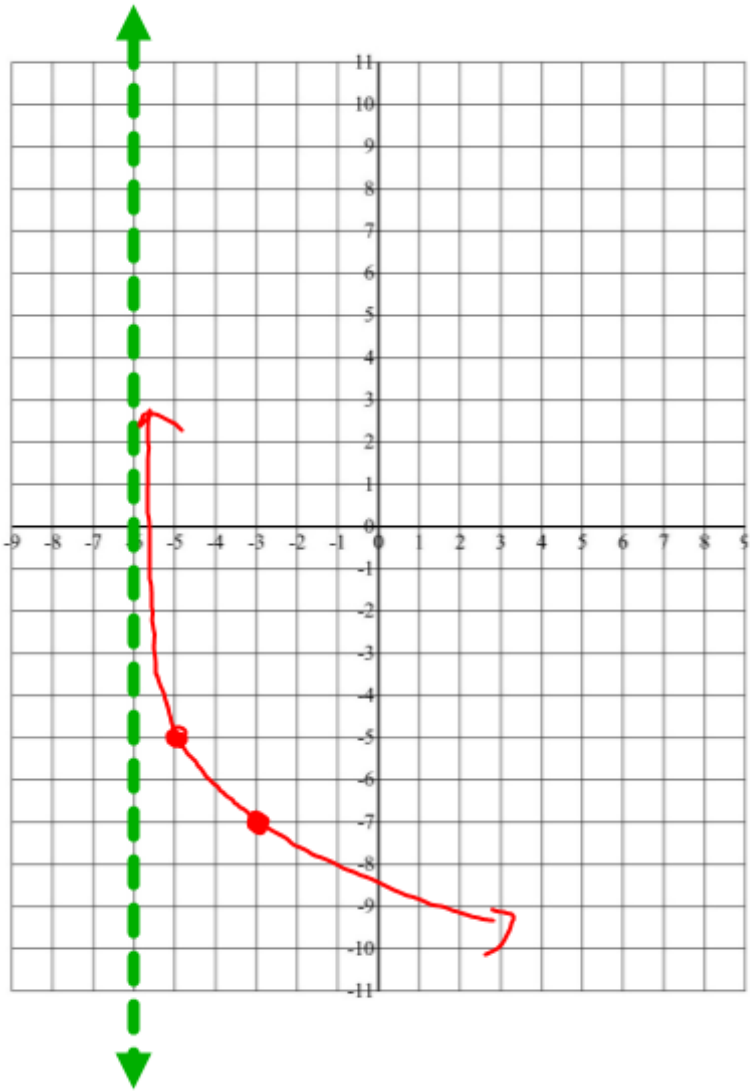
$$y = 2log_6(x + 6) - 5$$

$x=0$	$x=-6$	$x=-6$
$(1,0)$	$(-5,0)$	$(-5,0)$	$(-5,-5)$
$(6,1)$	$(0,1)$	$(0,2)$	$(0,-3)$
	left 6	Stretch by 2	down 5



$$y = -2\log_3(x+6) - 5$$

$x=0$	$x=-6$	$x=-6$	$x=-6$
$(1,0)$	$(-5,0)$	$(-5,0)$	$(-5,-5)$
$(3,1)$	$(-3,1)$	$(-3,-2)$	$(-3,-7)$
	Left 6	Stretch by -2	Down 5



Classwork:

Graphing Logs WS