

1. Sketch the graph of  $a(x) = \log_3(x-4) - 2$ . State the domain, range, end behavior and asymptote.

$y = 3^x$        $y = \log_3(x-4) - 2$   

x	y
-1	1/3
0	1
1	3

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

Swap x, y for log function      Right 4  
 Down 2

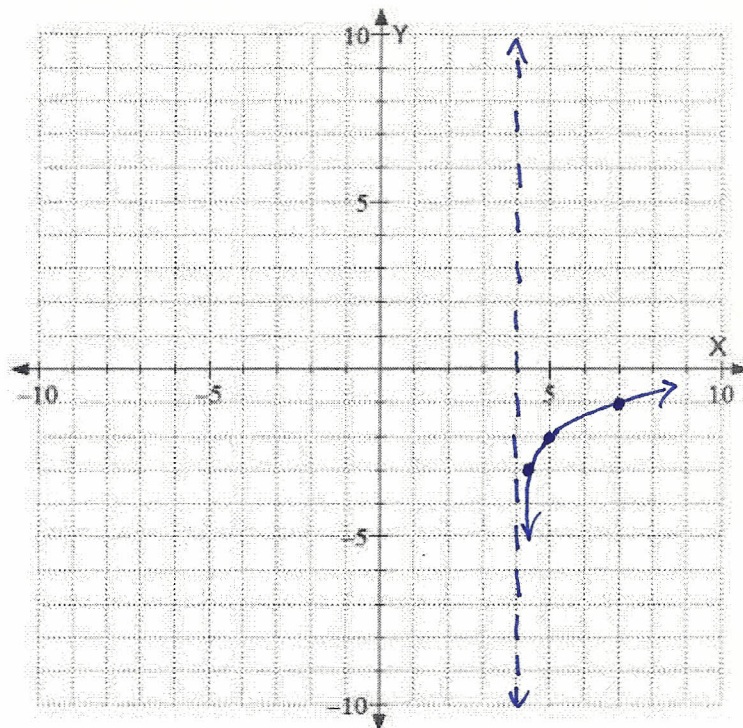
Domain:  $(4, \infty)$       Range:  $(-\infty, \infty)$

End Behavior:

As  $x \rightarrow$  4       $a(x) \rightarrow$   $-\infty$

As  $x \rightarrow$   $\infty$        $a(x) \rightarrow$   $\infty$

Asymptote:  $x = 4$



2. Sketch the graph of  $b(x) = -2\log_2(x+3)$ . State the domain, range, end behavior and asymptote.

$y = 2^x$        $y = -2\log_2(x+3)$   

x	y
-1	1/2
0	1
1	2

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

VD 2  
 Reflect over x-axis  
 Left 3

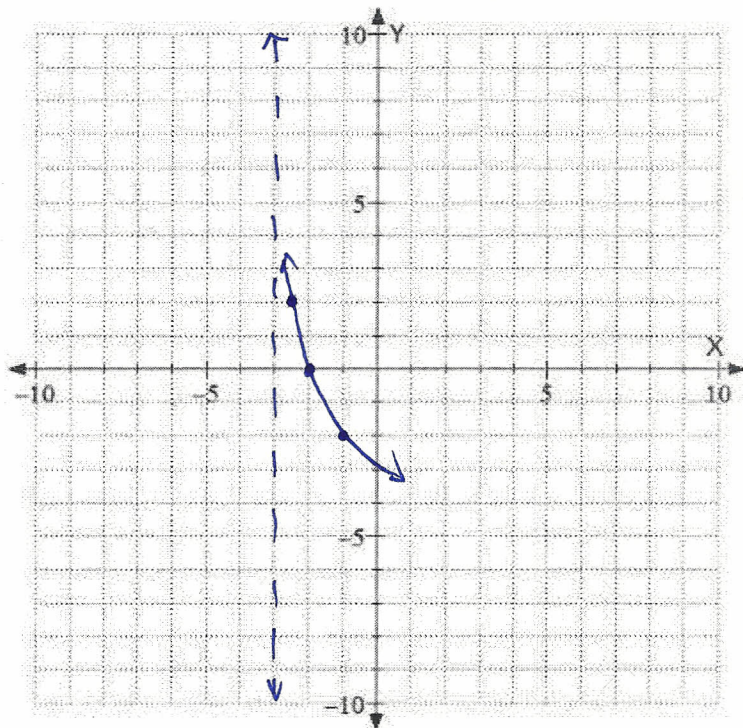
Domain:  $(-3, \infty)$       Range:  $(-\infty, \infty)$

End Behavior:

As  $x \rightarrow$   $-3$        $b(x) \rightarrow$   $\infty$

As  $x \rightarrow$   $\infty$        $b(x) \rightarrow$   $-\infty$

Asymptote:  $x = -3$



3. Sketch the graph of  $c(x) = \log(-x) + 4$ . State the domain, range, end behavior and asymptote.

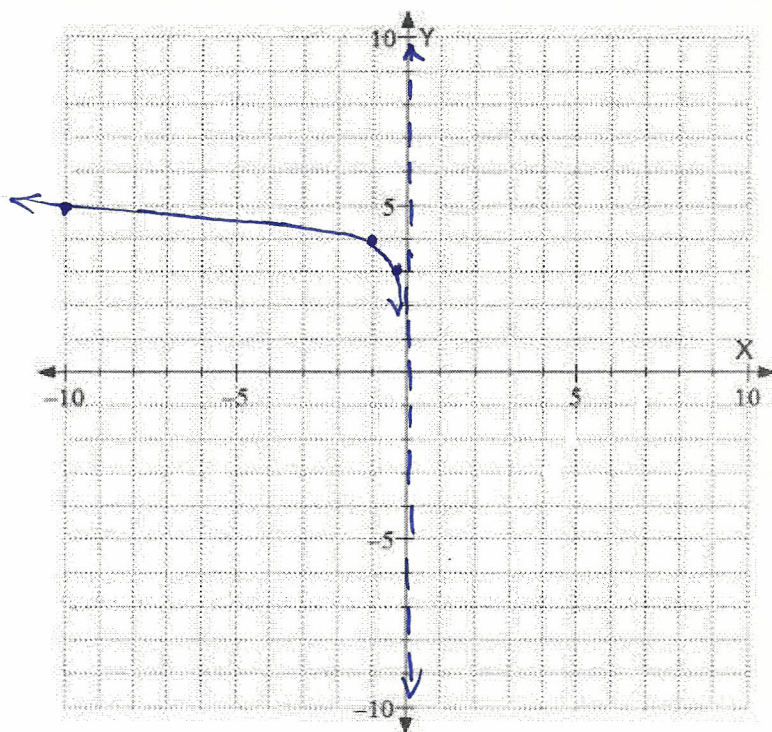
$$y = 10^x$$

x	y
-1	$\frac{1}{10}$
0	1
1	10

$$y = \log(-x) + 4$$

-x	x	y	y+4
$-\frac{1}{10}$	$\frac{1}{10}$	-1	3
-1	1	0	4
-10	10	1	5

Reflect over y  
up 4



Domain:  $(-\infty, 0)$  Range:  $(-\infty, \infty)$

End Behavior:

As  $x \rightarrow -\infty$   $c(x) \rightarrow \infty$

As  $x \rightarrow 0$   $c(x) \rightarrow -\infty$

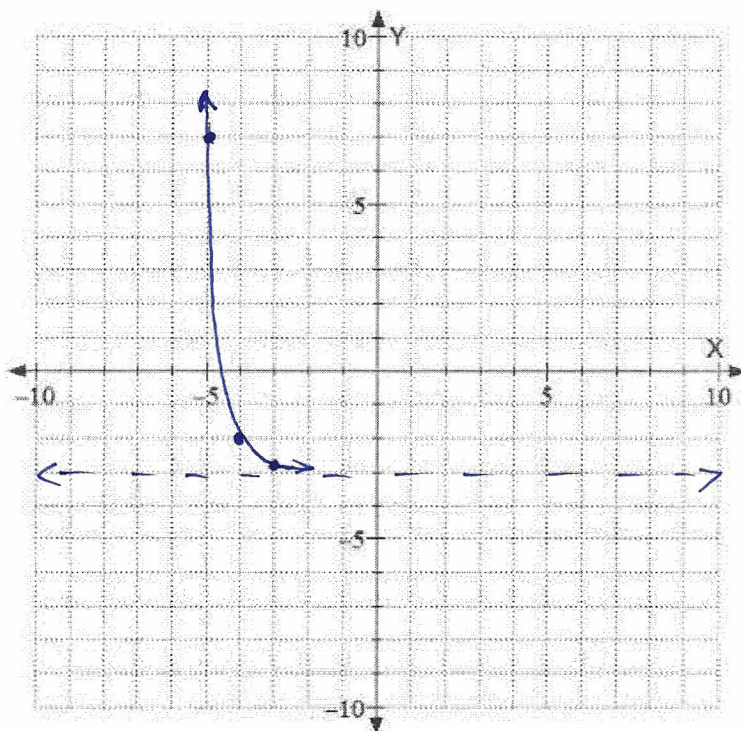
Asymptote:  $x = 0$

4. Sketch the graph of  $c(x) = \left(\frac{1}{10}\right)^{x+4} - 3$ . State the domain, range, end behavior and asymptote.

$$y = \left(\frac{1}{10}\right)^x$$

x-4	x	y	y-3
-5	-1	10	7
-4	0	1	-2
-3	1	$\frac{1}{10}$	$-2\frac{9}{10}$

Left 4  
Down 3



Domain:  $(-\infty, \infty)$  Range:  $(-3, \infty)$

End Behavior:

As  $x \rightarrow -\infty$   $c(x) \rightarrow \infty$

As  $x \rightarrow \infty$   $c(x) \rightarrow -3$

Asymptote:  $y = -3$

5. Sketch the graph of  $f(x) = -2(3)^x + 4$ . State the domain, range, end behavior and asymptote.

Parent  $y = 3^x$

x	y	-2y + 4
-1	$\frac{1}{3}$	$3\frac{1}{3}$
0	1	2
1	3	-2

VD 2  
Reflect over x  
up 4

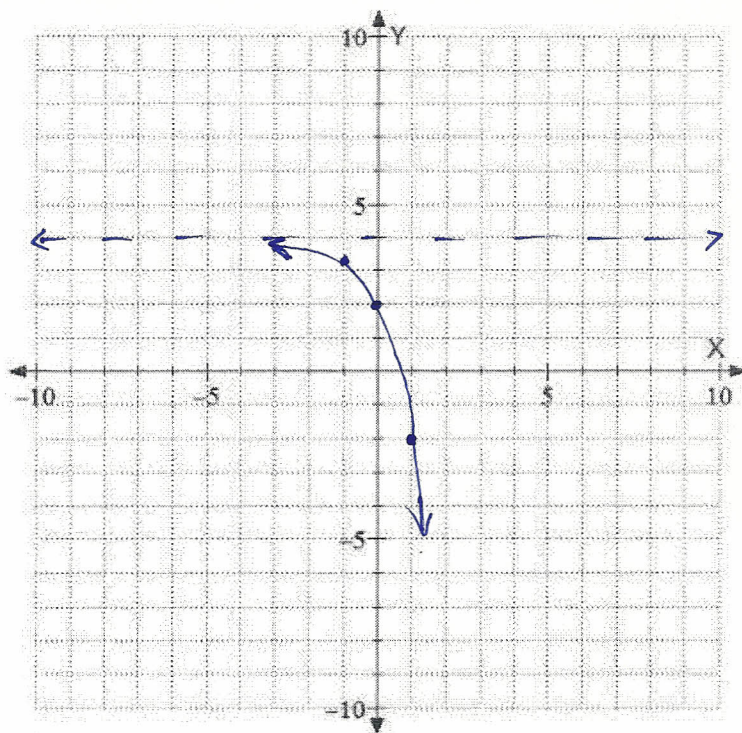
Domain:  $(-\infty, \infty)$  Range:  $(-\infty, 4)$

End Behavior:

As  $x \rightarrow -\infty$   $f(x) \rightarrow 4$

As  $x \rightarrow \infty$   $f(x) \rightarrow -\infty$

Asymptote:  $y = 4$



6. Sketch the graph of  $b(x) = 6(3)^{\frac{-x}{2}}$ . State the domain, range, end behavior and asymptote.

Parent  $y = 3^x$

-2x	x	y	6y
2	-1	$\frac{1}{3}$	2
0	0	1	6
-2	1	3	18

VD 6  
HD 2  
Reflect over y

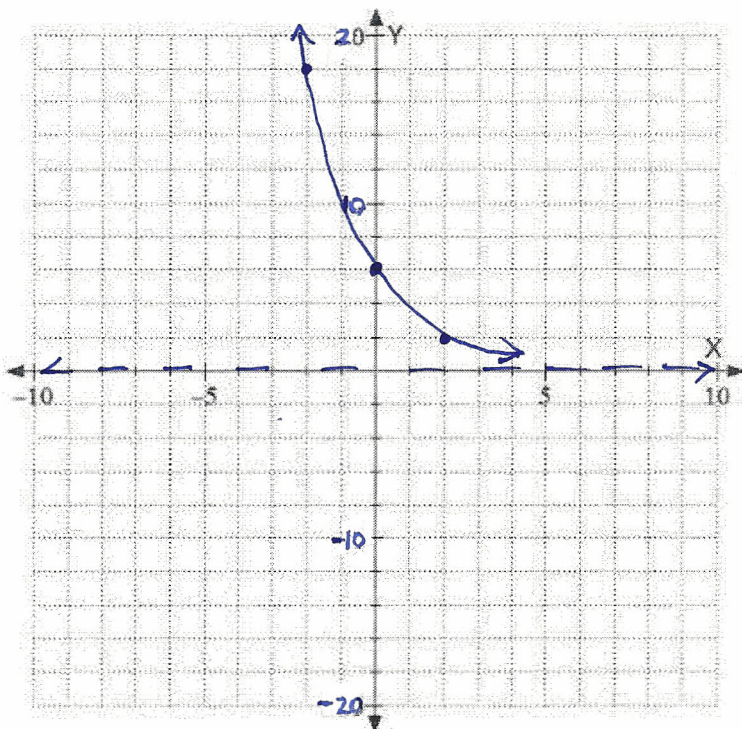
Domain:  $(-\infty, \infty)$  Range:  $(0, \infty)$

End Behavior:

As  $x \rightarrow -\infty$   $b(x) \rightarrow \infty$

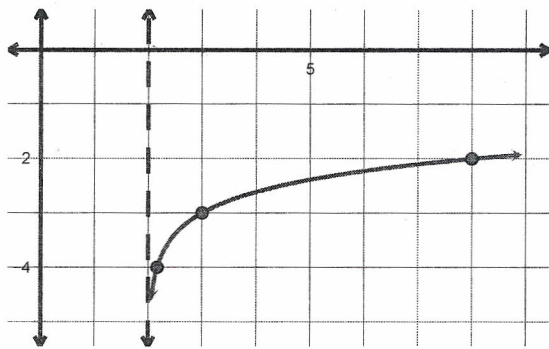
As  $x \rightarrow \infty$   $b(x) \rightarrow 0$

Asymptote:  $y = 0$



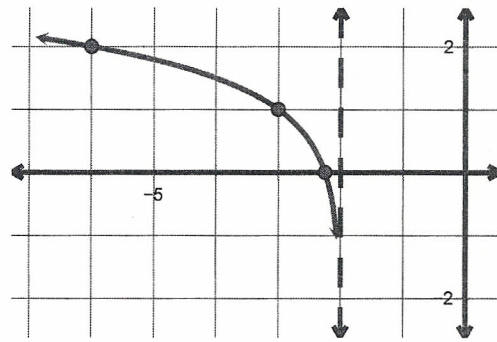
Find the equation of the following graphs.

7. Log base 6



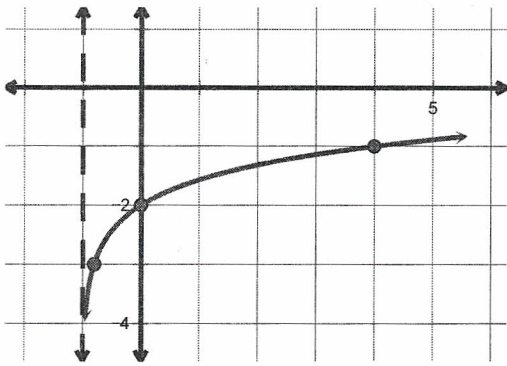
Right 2, Down 3  
 $y = \log_6(x-2) - 3$

8. Log base 4



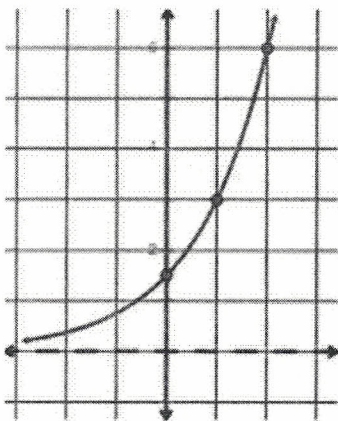
Reflect over y, left 2, up 1  
 $y = \log_4(-(x+2)) + 1$

9. Log base 5



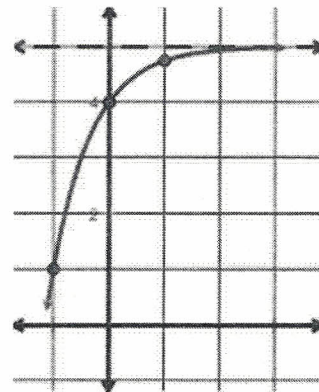
Left 1, down 2  
 $y = \log_5(x+1) - 2$

11. Base 2



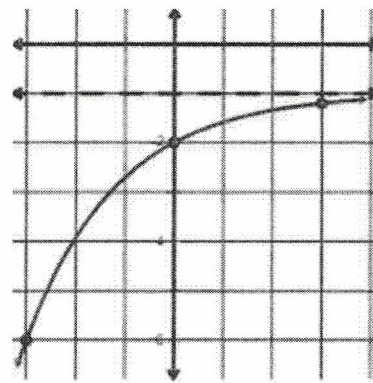
VD 3  
 Right 1  
 $y = 3(2)^{x-1}$

10. Base  $\frac{1}{4}$



Reflect over x, up 5  
 $y = -(\frac{1}{4})^x + 5$

12. Base  $\frac{1}{5}$



HD 3, Reflect over x, down 1  
 $y = -(\frac{1}{5})^{\frac{x}{3}} - 1$