

Graph each logarithmic function by performing the proper transformation of the parent function.

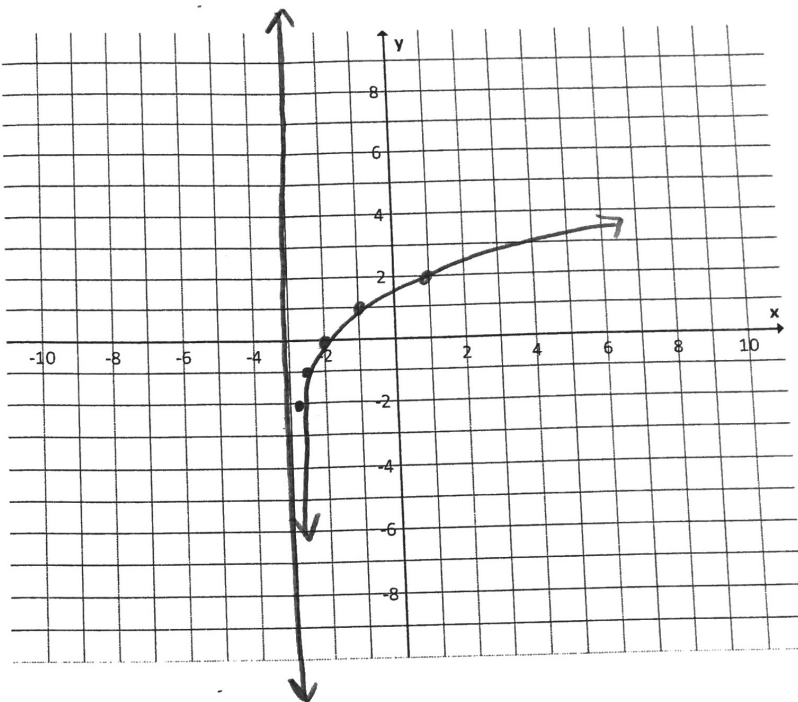
1. $f(x) = \log_2(x + 3)$

Parent:

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

Transformation:

$x-3$	y
-2.75	-2
-2.5	-1
-2	0
-1	1
1	2



Domain: $(-3, \infty)$

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

Asymptotes: $x = -3$

End behavior: $x \rightarrow -\infty, f(x) \rightarrow -\infty$
 $x \rightarrow \infty, f(x) \rightarrow \infty$

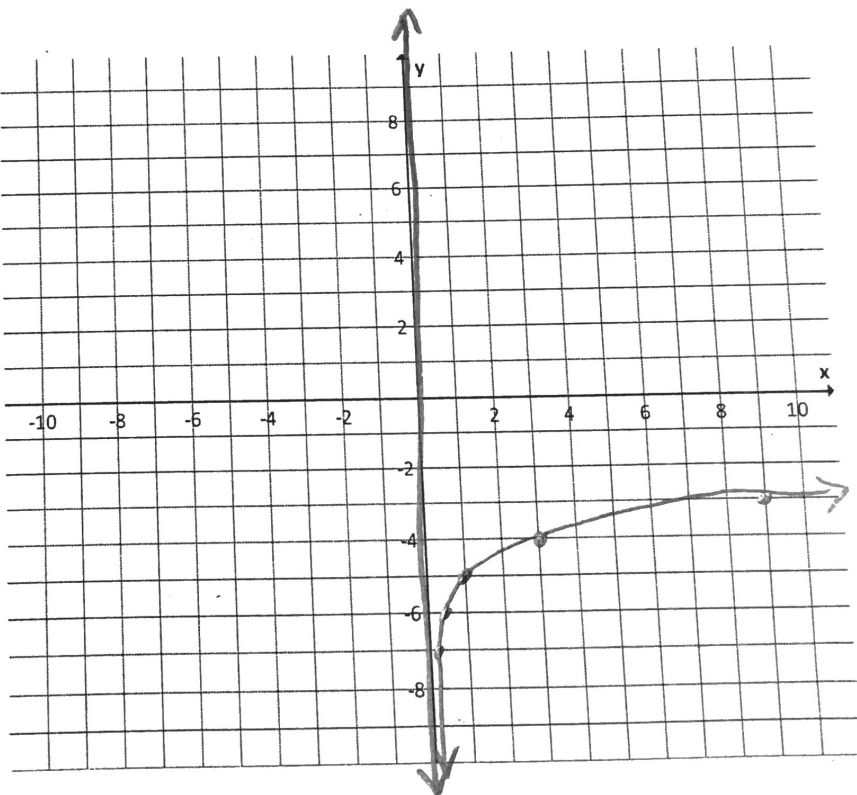
2. $f(x) = \log_3 x - 5$

Parent:

x	y
$\frac{1}{9}$	-2
$\frac{1}{3}$	-1
1	0
3	1
9	2

Transformation:

x	$y-5$
$\frac{1}{9}$	-7
$\frac{1}{3}$	-6
1	-5
3	-4
9	-3



Domain: $(0, \infty)$

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

Asymptotes: $x = 0$

End behavior: $x \rightarrow -\infty, f(x) \rightarrow -\infty$
 $x \rightarrow \infty, f(x) \rightarrow \infty$

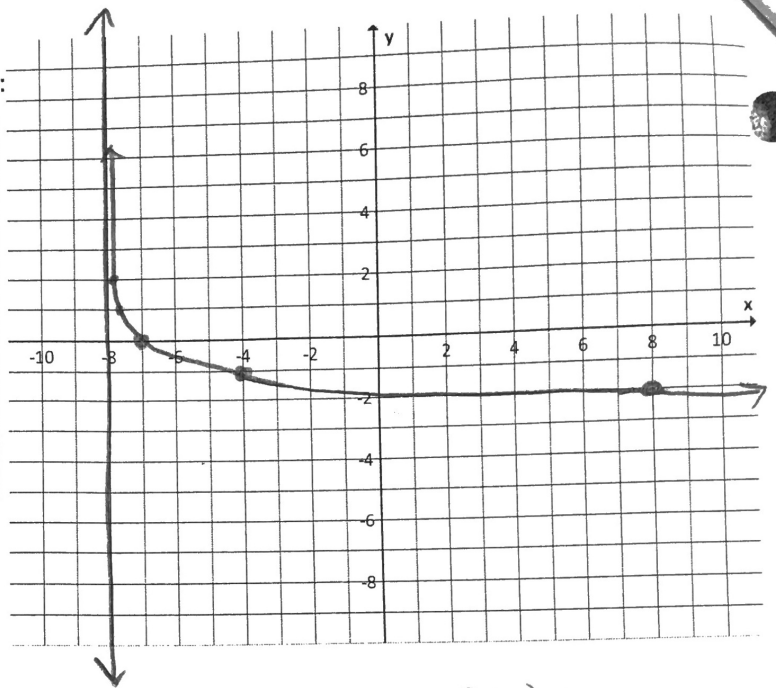
3. $f(x) = 2\log_{1/4}(x+8)$

Parent:

x	y
16	-2
4	-1
1	0
1/4	1
1/16	2

Transformation:

$x-8$	24
8	-2
-4	-1
-7	0
-7.75	1
-7.9375	2



Domain: $(-8, \infty)$

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

Asymptotes: $x = -8$

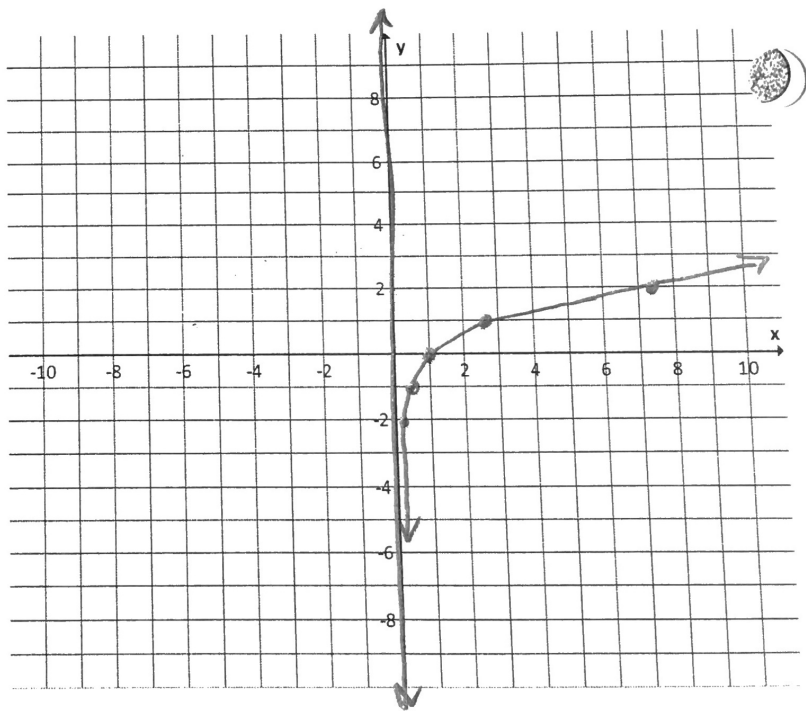
End behavior: $x \rightarrow -\infty, f(x) \rightarrow \infty$
 $x \rightarrow \infty, f(x) \rightarrow -\infty$

4. $f(x) = \ln(x)$

Parent:

	x	y
$1/e^2$.135	-2
$1/e$.368	-1
1	1	0
e	2.718	1
e^2	7.389	2

Transformation:



Domain: $(0, \infty)$

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

Asymptotes: $x = 0$

End behavior:

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

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

Parent:

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

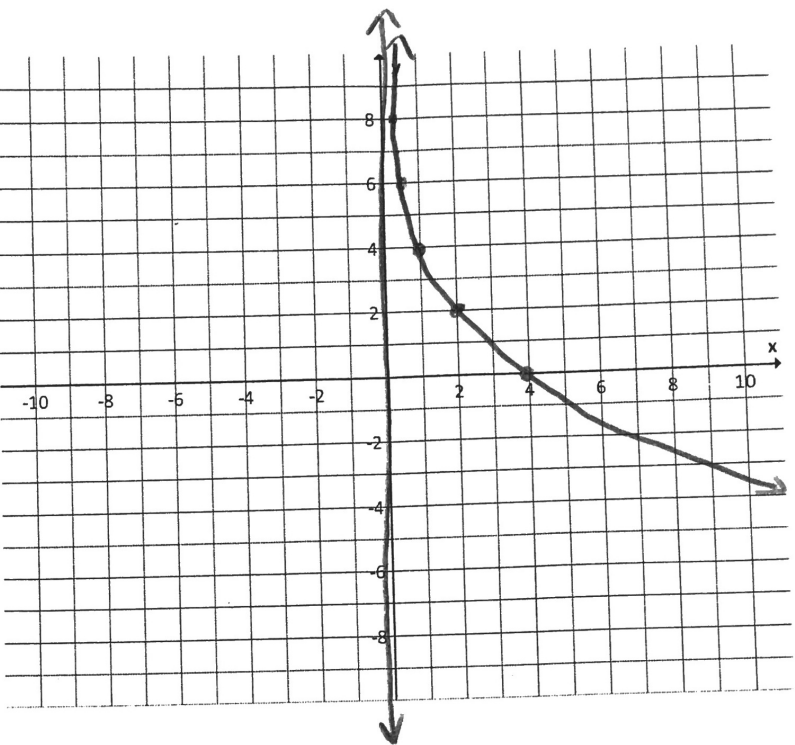
Transformation:

x	$-2y+4$
1/4	8
1/2	6
1	4
2	2
4	0

Domain: $(0, \infty)$

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

Asymptotes: $x=0$



End behavior:

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

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

6. $f(x) = \frac{1}{2} \log_{1/3}(x)$

Parent:

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

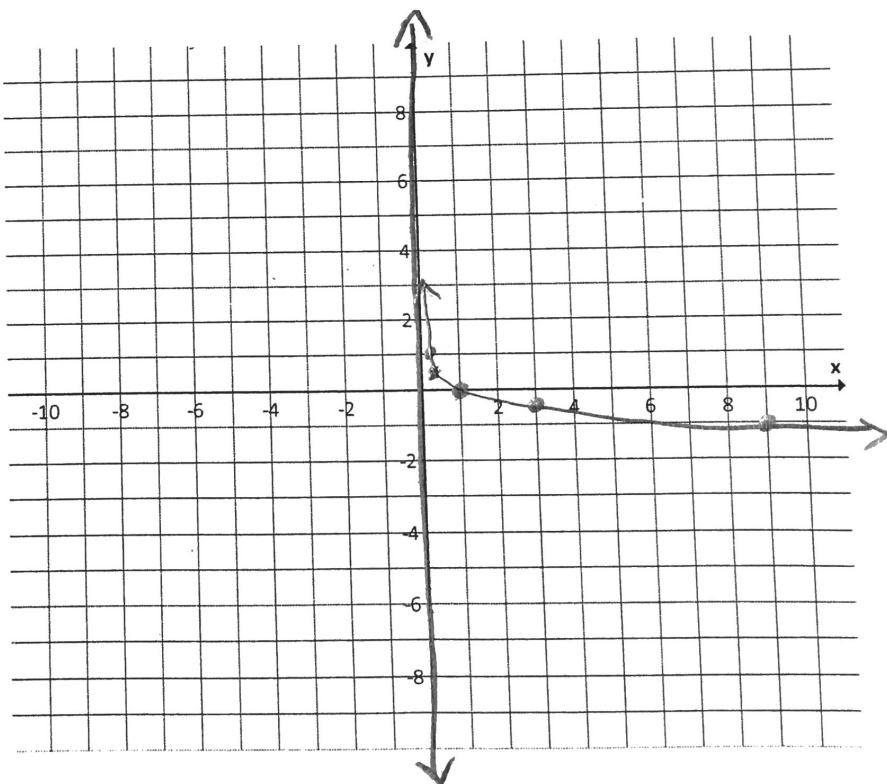
Transformation:

x	$\frac{1}{2}y$
9	-1
3	-0.5
1	0
1/3	0.5
1/9	1

Domain: $(0, \infty)$

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

Asymptotes: $x=0$



End behavior:

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

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

7. $f(x) = -2\ln(x-3) + 7$

Parent:

Transformation:

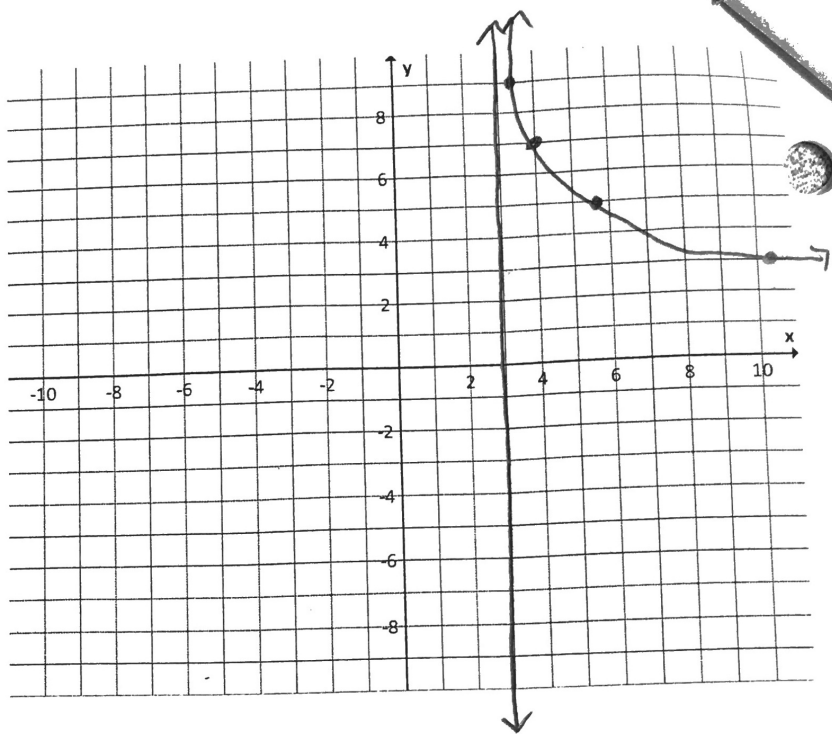
	x	y
$\frac{1}{e^2}$.135	-2
$\frac{1}{e}$.368	-1
1	1	0
e	2.718	1
e^2	7.389	2

$x+3$	$-2y+7$
3.135	11
3.368	9
4	7
5.718	5
10.389	3

Domain: $(3, \infty)$

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

Asymptotes: $x = 3$



End behavior:

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

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

8. $f(x) = 2\log(x+3) - 1$

Parent:

Transformation:

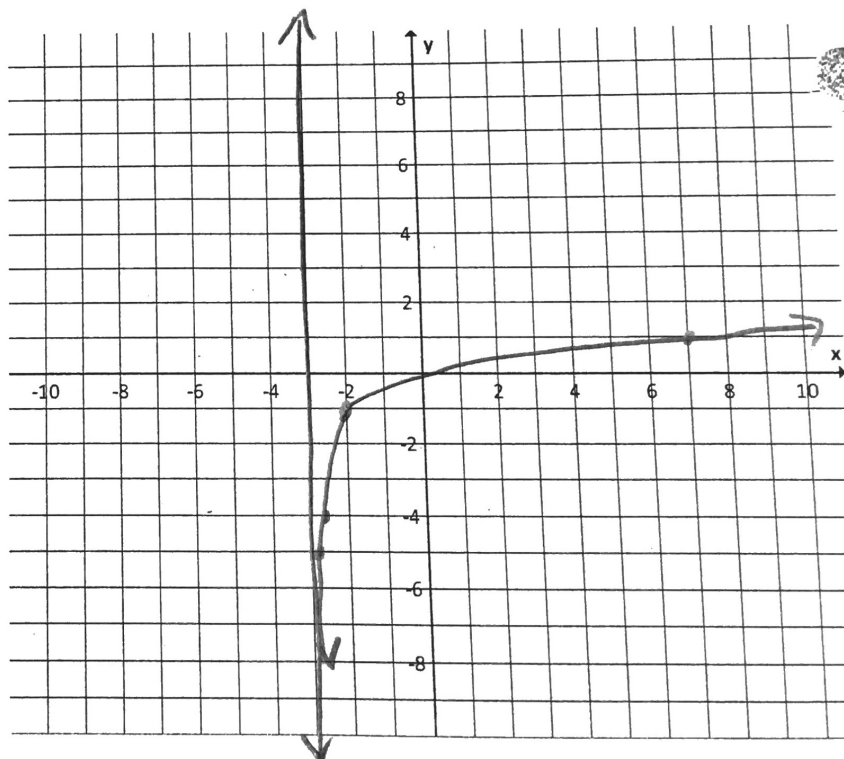
	x	y
$\frac{1}{100}$	-2	-2
$\frac{1}{10}$	-1	-1
1	0	0
10	1	1
100	2	2

$x-3$	$2y-1$
-2.99	-5
-2.9	-3
-2	-1
7	1
97	3

Domain: $(-3, \infty)$

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

Asymptotes: $x = -3$



End behavior:

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

$$x \rightarrow \infty, f(x) \rightarrow \infty$$

9. $f(x) = \frac{1}{2} \log_3(x+5)$

Parent:

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

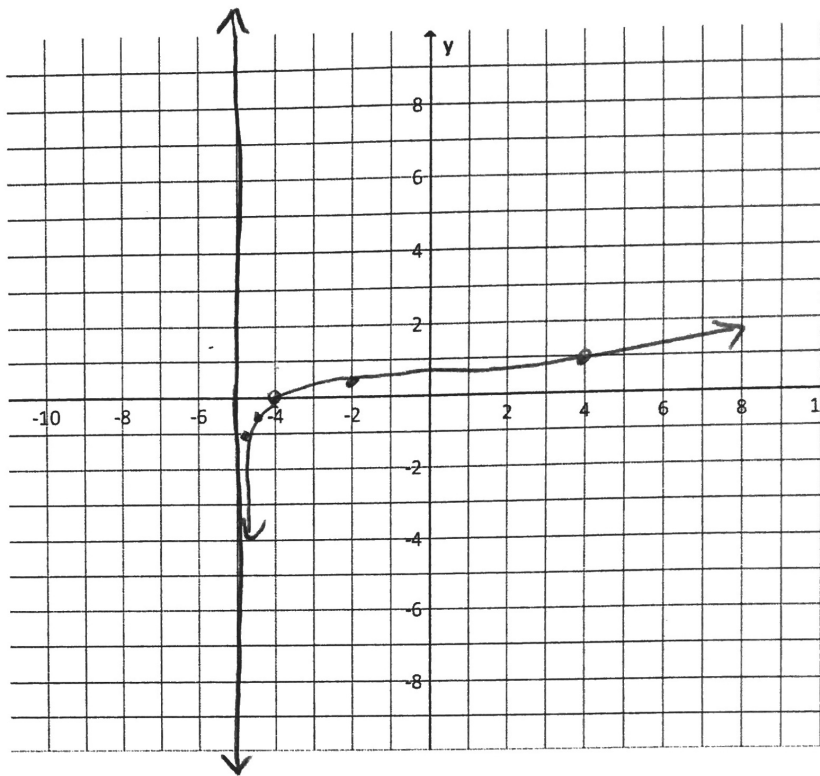
Transformation:

$x-5$	$\frac{1}{2}y$
$-4\frac{8}{9}$	-1
$-4\frac{2}{3}$	-0.5
-4	0
-2	.5
4	1

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

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

Asymptotes: $x = -5$



End behavior:

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

$$x \rightarrow \infty, f(x) \rightarrow \infty$$