

## Today's Plan:

**Learning Target (standard):** I will graph logarithmic functions using transformations. I will determine the intercepts of logarithmic functions.

**Students will:** Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

**Teacher will:** Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

**Assessment:** Board work, homework check and homework assignment

**Differentiation:** Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.



Go over your graphs with someone near you. Please do not hesitate to ask any questions you may have!

Graph using transformations. Find the domain and range and intercepts.

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

parent:  $f(x) = \log_2 x$  VA:  $x=0$

- 1)  $f(x) = -\log_2 x$  r x
- 2)  $f(x) = -2\log_2 x$  v.s. by 2
- 3)  $f(x) = -2\log_2(x-1)$  shift right 1  
VA:  $x=1$
- 4)  $f(x) = -2\log_2(x-1) + 2$  shift up 2

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

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

$D: \{x | x > 1\}$   
 $R: \mathbb{R}$

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

Graph using transformations. Find the domain and range and intercepts.

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

$x-1 > 0$   
 $x > 1$

$D: \{x | x > 1\}$   
 $R: \mathbb{R}$

$I_x: (3, 0)$

$$0 = -2\log_2(x-1) + 2$$

$$-2 = -2\log_2(x-1)$$

$$1 = \log_2(x-1)$$

$$2^1 = x-1$$

$$2 = x-1$$

$$x = 3$$

$I_y: (0, -)$

$$y = -2\log_2(0-1) + 2$$

$$y = -2\log_2(-1) + 2$$

$\log_2(-1) = c$   
 ~~$2^c = -1$~~

$\log_2 2 = c$   
 $2^c = 2$   
 $c = 1$

Graph using transformations. Find the domain and range and intercepts.

$$f(x) = \frac{1}{2} \log_{\frac{1}{2}}(3-x) - 4$$

parent:  $f(x) = \log_{\frac{1}{2}} x \quad \forall A: x=0$

- 1)  $f(x) = \log_{\frac{1}{2}}(-x)$  r y
- 2)  $f(x) = \frac{1}{2} \log_{\frac{1}{2}}(-x)$  v.r. by  $\frac{1}{2}$
- 3)  $f(x) = \frac{1}{2} \log_{\frac{1}{2}}(-1(x-3))$  shift right 3  
VA:  $x=3$
- 4)  $f(x) = \frac{1}{2} \log_{\frac{1}{2}}(3-x) - 4$  shift down 4

$3-x > 0$   
 $-x > -3$   
 $x < 3$

$D: \{x \mid x < 3\}$   
 $R: \mathbb{R}$

$y = \log_{\frac{1}{2}} x$	$x \mid y$
	$4 \mid -2$
$x = (\frac{1}{2})^y$	$2 \mid -1$
	$1 \mid 0$
	$\frac{1}{2} \mid 1$
	$\frac{1}{4} \mid 2$

Graph using transformations. Find the domain and range and intercepts.

$$f(x) = \frac{1}{2} \log_{\frac{1}{2}}(3-x) - 4$$

$I_x: (\frac{767}{256}, 0)$

$I_y: (0, \frac{1}{2} \log_{\frac{1}{2}} 3 - 4)$

$$0 = \frac{1}{2} \log_{\frac{1}{2}}(3-x) - 4$$

$$4 = \frac{1}{2} \log_{\frac{1}{2}}(3-x)$$

$$8 = \log_{\frac{1}{2}}(3-x)$$

$$(\frac{1}{2})^8 = 3-x$$

$$\frac{1}{256} = 3-x$$

$$\frac{1}{256} - 3 = -x$$

$$-\frac{767}{256} = -x$$

$$x = \frac{767}{256}$$

$$y = \frac{1}{2} \log_{\frac{1}{2}}(3-0) - 4$$

$$y = \frac{1}{2} \log_{\frac{1}{2}}(3) - 4$$

$$\log_{\frac{1}{2}} 3 = c$$

$$(\frac{1}{2})^c = 3$$

Find the domain and range and intercepts.

$$f(x) = \ln(4-2x) + 3$$

D:  $\{x \mid x < 2\}$   $\begin{cases} 4-2x > 0 \\ -2x > -4 \\ x < 2 \end{cases}$

R:  $\mathbb{R}$

I<sub>x</sub>:  $\left(\frac{4e^3-1}{2e^3}, 0\right)$

I<sub>y</sub>:  $(0, \ln 4 + 3)$

$$y = \ln(4-2x) + 3$$

$$0 = \ln(4-2x) + 3$$

$$-3 = \ln(4-2x)$$

$$e^{-3} = 4-2x$$

$$\frac{1}{e^3} = 4-2x$$

$$\frac{1}{e^3} - 4 = -2x$$

$$-\frac{1}{2e^3} + 2 = x$$

$$x = 2 - \frac{1}{2e^3}$$

$$x = \frac{4e^3-1}{2e^3}$$

$$y = \ln(4-2x) + 3$$

$$y = \ln(4-0) + 3$$

$$y = \ln 4 + 3$$

↓  $c = \ln 4$   
 $e^c = 4$

Write transformations for all. Graph 3 of the 5 using transformations. Find the domain and range and intercepts for each of the 5 functions.

\* use exact values \*

1)  $f(x) = -2\log_3(x-1) + 1$

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

2)  $f(x) = \frac{1}{2}\log_4(2-x) - 1$

5)  $f(x) = -2 + \frac{1}{2}\log_5(x+1)$

3)  $f(x) = -3\log_2\left(1 - \frac{1}{2}x\right) + 2$