

Lesson 56 Objective: SWBAT transform log functions.

Kickoff

Rewrite the equation in exponential form.

$\log_7 49 = 2$

$7^2 = 49$

$\log_5 125 = 3$

$5^3 = 125$

Rewrite the equation in logarithmic form.

$13^2 = 169$

$\log_{13} 169 = 2$

$9^{3/2} = 27$

$\log_9 27 = 3/2$

Transformations of Log Functions

Try This: Identify the transformations that maps $f(x) \rightarrow g(x)$ if $f(x) = 2^x$

1) $g(x) = 2^x - 3$

Down 3

2) $g(x) = 2^{x+4}$

Left 4

3) $g(x) = -2^x$

Reflect over x-axis

4) $g(x) = 2^{x-3} + 1$

Right 3

Up 1

5) $g(x) = -2^{x-2}$

Right 2

Reflect over x-axis

Transformations with Log Functions: $f(x) = \log_a x$

1) Vertical Shifts (up or down)

$f(x) = \log_a x + b$

$b > 0 \uparrow$
 $b < 0 \downarrow$

2) Horizontal Shifts (\leftarrow and \rightarrow)

$f(x) = \log_a(x+b)$

$b < 0 \rightarrow$
 $b > 0 \leftarrow$

3) Reflection over the x-axis

$f(x) = \log_a x$

$-\log_a x$

4) Reflection over the y-axis

$f(x) = \log_a(x)$
 $\log_a(-x)$

Remember: $f(x) = \log_a x$ passes through the point (1, 0). start your shifts and reflections there!!!

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Remember: $x = 0$ is a vertical asymptote!!!

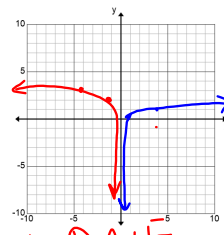
Example: Name the transformation that maps $f(x) \rightarrow g(x)$, under the given transformation. State the domain, range, asymptotes, intercepts and sketch the graph.

1) $f(x) = \log_4 x$
 $g(x) = \log_4(-x) + 2$

x	y
1	0
4	1

subtract y up 2

x	y
-1	2
-4	3

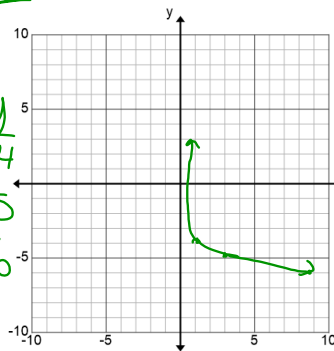


D: $(-\infty, 0)$
R: $(-\infty, \infty)$

y-int DNE
x-int $(-0.0225, 0)$
VA = $x = 0$

2) $f(x) = \log_3 x$
 $g(x) = -\log_3 x - 4$

x	y
1	-4
3	-5
9	-6



D: $(0, \infty)$
R: $(-\infty, \infty)$
y-int DNE
VA $\rightarrow x = 0$
x-int $(0.0225, 0)$

3) $f(x) = \log_5 x$
 $g(x) = 2 + \log_5(x + 7)$

X	Y
-6	2
-2	3

D: $(-7, \infty)$
 R: $(-\infty, \infty)$
 VA $\rightarrow X = -7$
 y-int $(0, 3.2)$ x-int $(-6.96, 0)$