Name: _____ Date: _____ IB Math A&A SL

Lesson 3.5 - Graphs of Logarithmic Equations

I. Warm-Up

1. Rewrite in exponential form. Solve for x. $0 = \log_3(x-2)$

$3^0 = x - 2$ $1 = x - 2$ $x = 3$

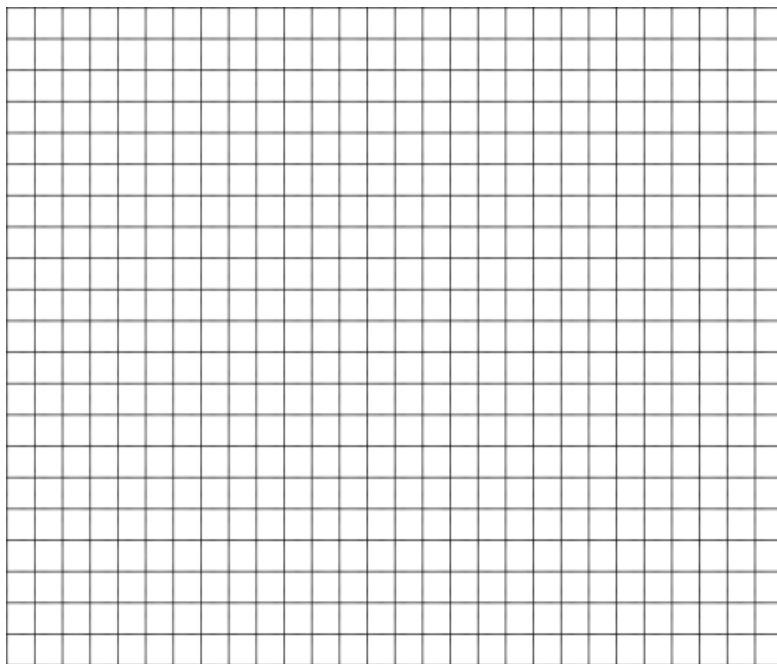2. Evaluate $\log_9(\sqrt{3})$ $9^x = \sqrt{3}$ $x = \frac{1}{4}$

3. Graph (on the same axes & label)
a. $y = 2^x$
b. $y = 2^{-x}$
c. $y = \left(\frac{1}{2}\right)^x$
d. Inverse of part a.

Check on Desmos.

Properties of Log Graphs

Domain – make the inside > 0.
A vertical asymptote will
mark the restricted domain.

II. Practice – For each of the functions find:
(a) The domain.   (b). the vertical asymptotes   (c). the intercepts
4. $f(x) = \log_6(x-1)$

Vertical Asymptote: $x = 1$ Domain: $\{x|x > 1\}$ x-intercept: (2,0)

y-intercept: none

5. $g(x) = \log_2(x+1) - 3$

Vertical Asymptote: $x = -1$ Domain: $\{x|x > -1\}$ x-intercept: (7,0)

y-intercept: $(0, -3)$

6. $h(x) = \log_3(-x+3) + 2$

Vertical Asymptote: $x = 3$ Domain: $\{x|x < 3\}$ x-intercept: $(2\frac{8}{9}, 0)$

y-intercept: $(0, 3)$

Find the domain, vertical asymptotes, and intercepts for each function. Then sketch a graph.

7. $f(x) = \log_3(1 - x)$

Vertical Asymptote: $x = 1$

Domain: $\{x | x < 1\}$

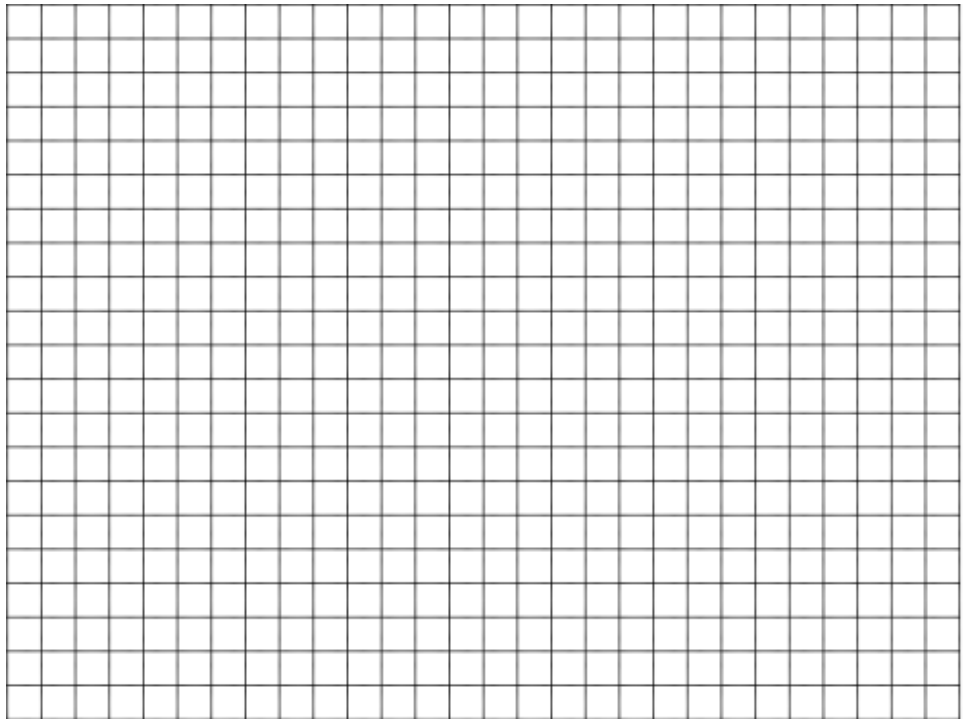$0 = \log_3(1 - x)$

$3^0 = 1 - x$

$x = 0$

x-intercept: (0,0)

$f(x) = \log_3(1 - 0)$

$f(x) = \log_3(1)$

$f(x) = 0$

y-intercept: (0,0)

Check graph on Desmos.

8. $f(x) = \log_4(x - 3) + 1$

Vertical Asymptote: $x = 3$

Domain: $\{x | x > 3\}$

$0 = \log_4(x - 3) + 1$

$-1 = \log_4(x - 3)$

$4^{-1} = x - 3$

$x = \dfrac{1}{4} + 3 = 3\dfrac{1}{4}$
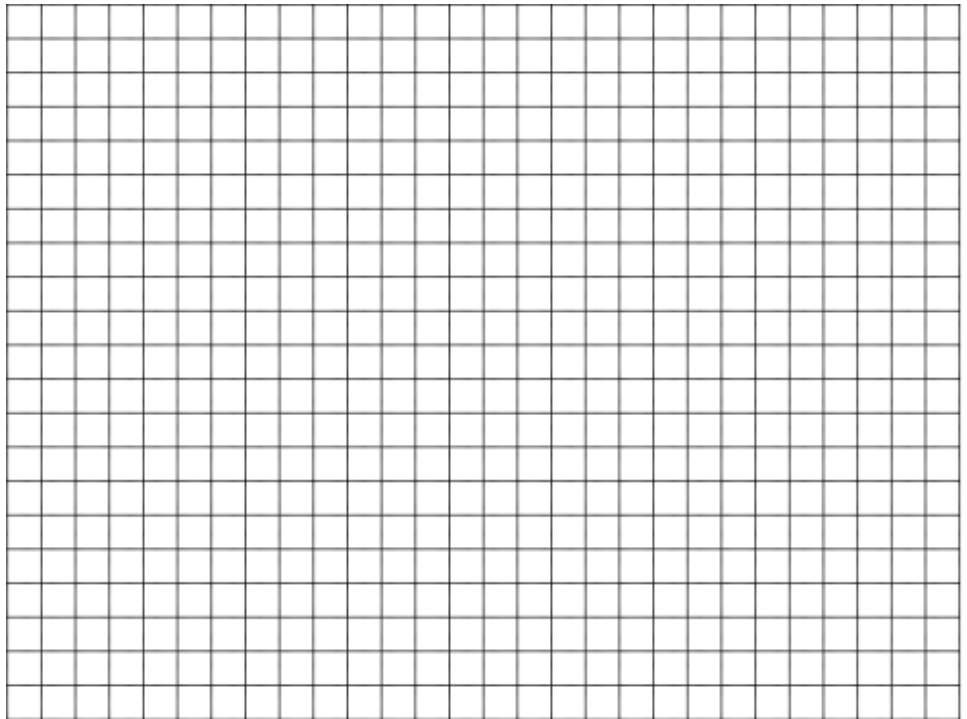
x-intercept: $(3.25, 0)$

$f(x) = \log_4(0 - 3) + 1$

$f(x) = \log_3(-3) + 1$

y-intercept: none

Check graph on Desmos.

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

Vertical Asymptote: $x = -2$

Domain: $\{x | x > -2\}$

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

$e^0 = x + 2 = 1$

$x = -1$

x-intercept: $(-1, 0)$

$f(x) = \ln(0+2)$

$f(x) = -\ln(2)$

y-intercept: $(0, -\ln(2))$

Check graph on Desmos.

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

Vertical Asymptote: $x = 4$

Domain: $\{x | x > 4\}$

$0 = \ln(4-x)$

$e^0 = 4 - x$

$x = 3$

x-intercept: $(3, 0)$

$f(x) = \ln(4-0)$

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

y-intercept: $(0, \ln(4))$

Check graph on Desmos.