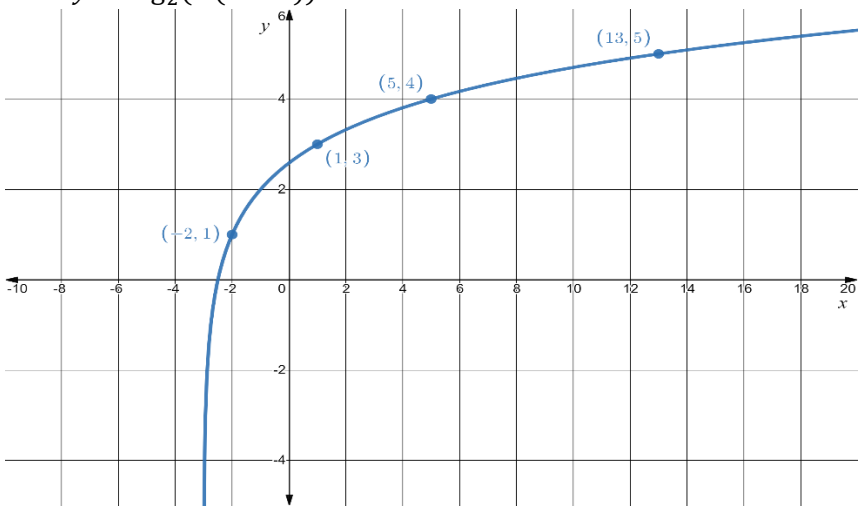
Name: _____ Date: _____

Learning Goal 7.1	Applying one or more transformations to exponential and logarithmic functions, including translations, stretches and reflections.

1. Graph the following functions on the grids below, then complete the table.

a. $y = \log_2(2(x+3))$



Domain
$\{x|x > -3, x \in \mathbb{R}\}$

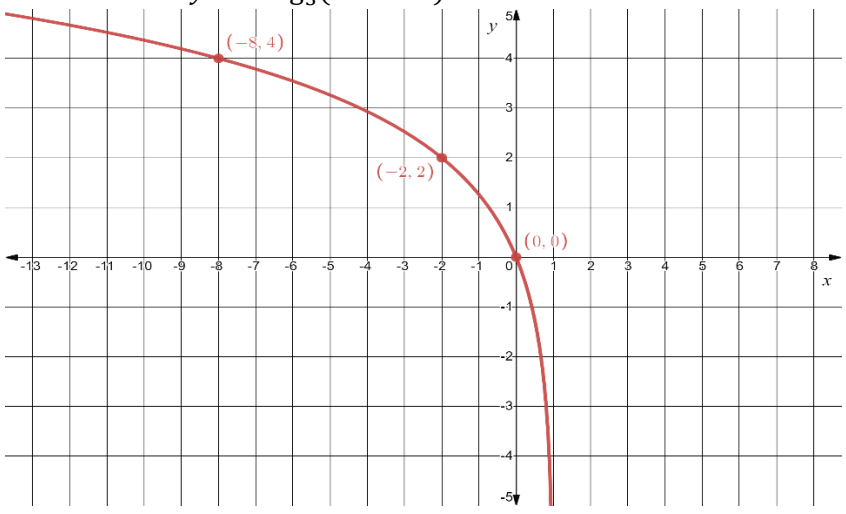
Range
$\{y|y \in \mathbb{R}\}$

$x-$ intercept
$x = -2.5$

$y-$ intercept
$y = \log_2(6)$

Asymptote
$x = -3$

b. $y = 2\log_3(-x+1)$



Domain
$\{x|x < 1, x \in \mathbb{R}\}$

Range
$\{y|y \in \mathbb{R}\}$

$x-$ intercept
$x = 0$

$y-$ intercept
$y = 0$

Asymptote
$x = 1$

2. In 1935, American seismologist Charles R. Richter developed a scale formula for measuring the magnitude of earthquakes. The Richter magnitude *M* of an earthquake is defined as

$$M = log\frac{A}{A_0},$$

where A is the amplitude of the ground motion, usually in microns, measured by a sensitive seismometer and A_0 is the amplitude, corrected for the distance to the actual earthquake that would be expected for a "standard" earthquake.

a) In 1946, an earthquake struck Vancouver Island off the coast of British Columbia. It had an amplitude that was $10^{7.3}$ times A_0 . What was the earthquake's magnitude on the Richter scale?

$$\begin{aligned} M &= \log\frac{10^{7.3}A_0}{A_0} \\ &= \log 10^{7.3} \\ &= 7.3 \end{aligned}$$

b) The strongest recorded earthquake in Canada struck Haida Gwaii, off the coast of British Columbia, in 1949. It had a Richter reading of 8.1. How many times as great as A_0 was its amplitude?

$$\begin{aligned} 8.1 &= \log\frac{A \times A_0}{A_0} \\ 8.1 &= \log A \\ A &= 10^{8.1} \end{aligned}$$

c) Compare the seismic shaking of the 1949 Haida Gwaii earthquake with that of the earthquake that struck Vancouver Island in 1946.

$$\begin{aligned} \frac{A_0 \times 10^{8.1}}{A_0 \times 10^{7.3}} &= \frac{10^{8.1}}{10^{7.3}} \\ &= 10^{0.8} \\ &= 6.3 \text{ times more intense} \end{aligned}$$