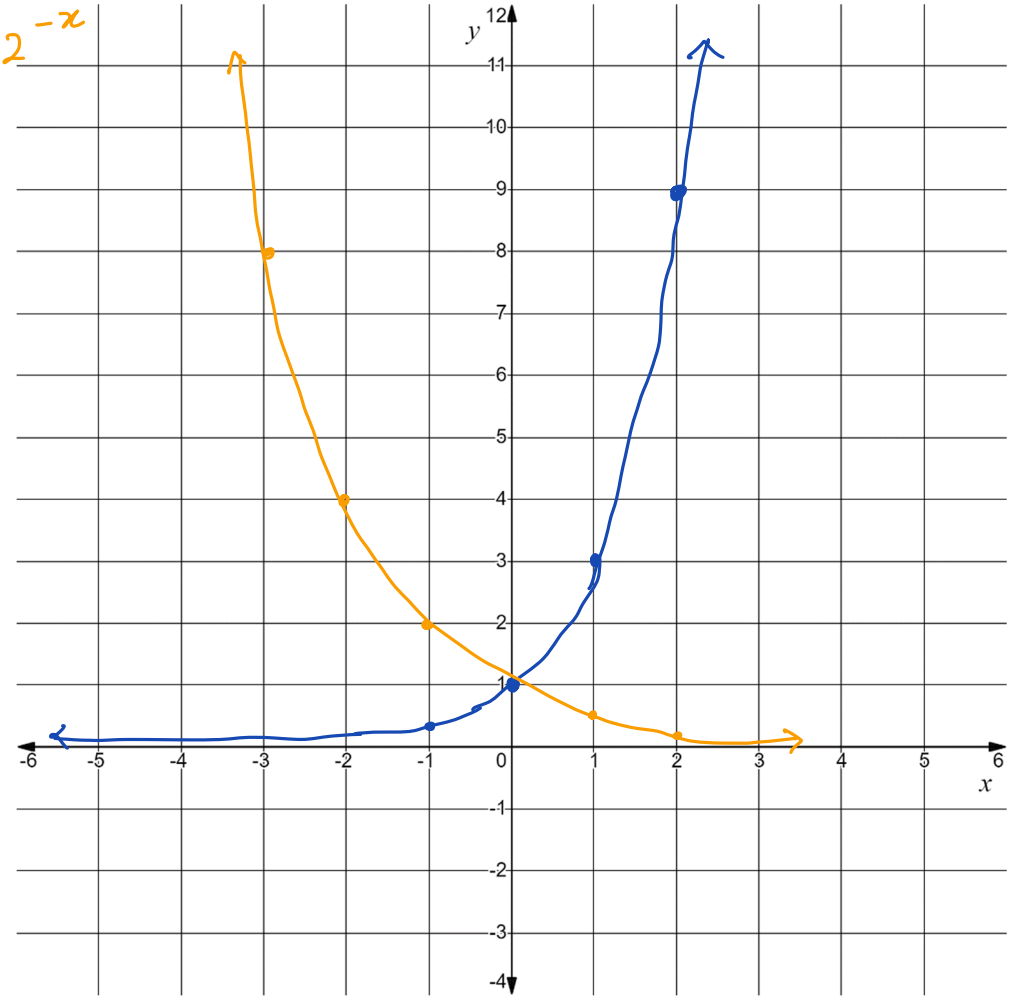
Name: _____ Date: _____

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

Example Graph by hand $y = 3^x$ and $y = (1/2)^x$ on the same axes, using a table of values.

x	3^x	$\left(\frac{1}{2}\right)^x = 2^{-x}$
-3	$\frac{1}{27}$	8
-2	$\frac{1}{9}$	4
-1	$\frac{1}{3}$	2
0	1	1
1	3	$\frac{1}{2}$
2	9	$\frac{1}{4}$
3	27	$\frac{1}{8}$



asymptote on the x-axis.

What happens to the graph of $y = 3^x$ as x becomes more and more negative, without bound? $\lim_{x \to -\infty}$

- the denominator of the fraction $\to \infty$
- the fraction is approaching zero.

What happens to the graph of $y = (1/2)^x$ as x becomes more and more positive, without bound? $x \to \infty$

- the denominator of the fraction $\to \infty$
- the fraction is approaching zero.

Assignment p. 342 # 1 – 5, 7, 8, 15, C1, C2 Quiz Next Day!

Compare	Graph of $y = 3^x$	Graph of $(1/2)^x$	Graph of $y = b^x$
Vertical intercept (y-, $x=0$)	$y = 1$	$y = 1$	$y = 1$
Horizontal intercept (x-, $y=0$)	none	none	none.
Domain & Range	$x \in \mathbb{R}$, $y > 0, y \in \mathbb{R}$	$x \in \mathbb{R}$, $y > 0, y \in \mathbb{R}$	$x \in \mathbb{R}$, $y > 0, y \in \mathbb{R}$
Asymptote	$y = 0$	$y = 0$	$y = 0$

If $b > 1$, $\lim_{x \to -\infty} b^x = 0$ * asymptote is in -ve x space

↑ flip the fraction, and the denominator grows exponentially.

If $0 < b < 1$ $\lim_{x \to \infty} \left(\frac{1}{b}\right)^x = 0$ * asymptote is in +ve x space.

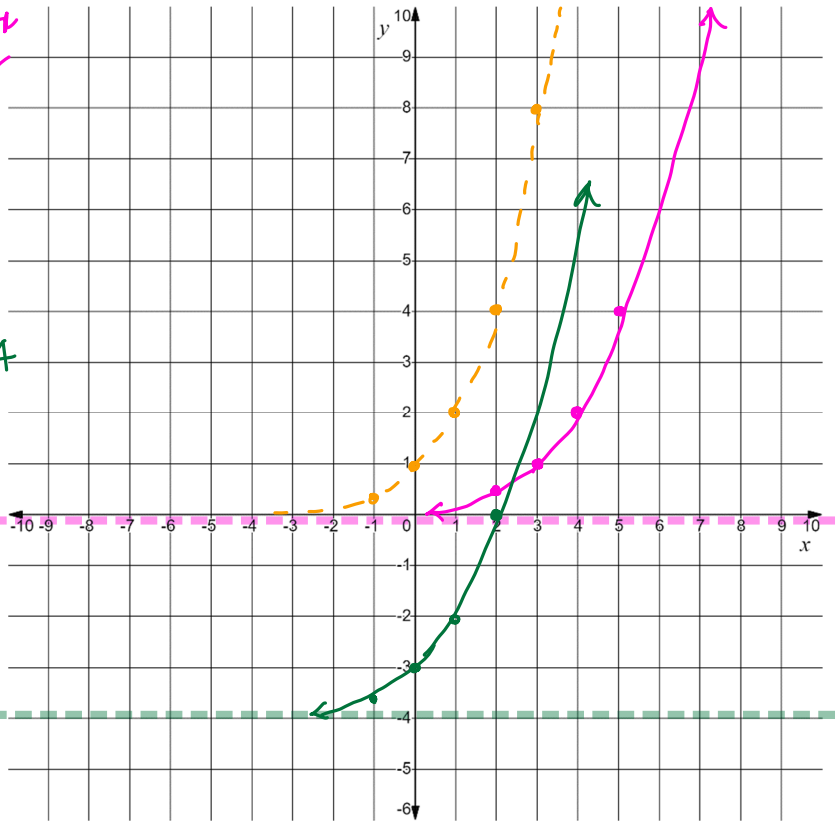
↳ the denominator is growing exponentially

Example Graph the function $y = 2^x$.

a. Graph $y = 2^{(x-3)}$ ← right by 3

b. Graph $y = 2^x - 4$

base function $y = 2^x$



y	$y-4$
$\frac{1}{2}$	$-\frac{7}{2}$
1	-3
2	-2
4	0

c. Identify the following features of the transformed graphs.

	$y = 2^{(x-3)}$	$y = 2^x - 4$
Asymptote	$y = 0$	$y = 0 - 4 = -4$
Domain	$\{x \mid x \in \mathbb{R}\}$	$\{x \mid x \in \mathbb{R}\}$
Range	$\{y \mid y > 0, y \in \mathbb{R}\}$	$\{y \mid y > -4, y \in \mathbb{R}\}$
$x-$ Intercept	none	$x = 2$
$y-$ Intercept	$y = \frac{1}{8}$	$y = -3$