Math 3
Warm-Up:

$y = b^x \Rightarrow \log_b y = x$

Find the inverse of each function.

1) $y = 4^x$

$x = 4^y$

$\log_4 x = y$

2) $y = 3^x$

$y = \log_3 x$

$x = 3^y$

$\log_3 x = y$

$y(\log_3 x) = 1$

$\frac{y(\log_3 x)}{\log_3 x} = \frac{1}{\log_3 x}$

$y = \frac{1}{\log_3 x}$

3) $y = 5^x$

$x = 5^y$

$\log_5 x = y$

4) $y = 3^x$

$x = 3^y$

$\log_3 x = y$

GUIDED NOTES

Graphing Exponential Functions

OBJECTIVE: I can identify the types of exponential functions, as well as evaluate and graph them

Exponential functions have the form: $y = b^x$;
where b is the base, and x is any real number.

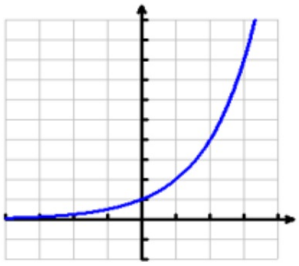
Domain: $(-\infty, \infty)$ Range: $(0, \infty)$

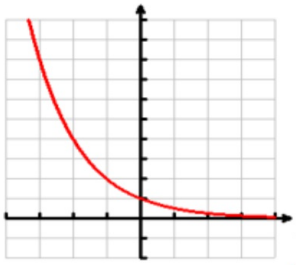
There are two basic types of exponential functions...

This type is a Function.

$f(x) = b^x$

Where x is positive





this type is a Function.

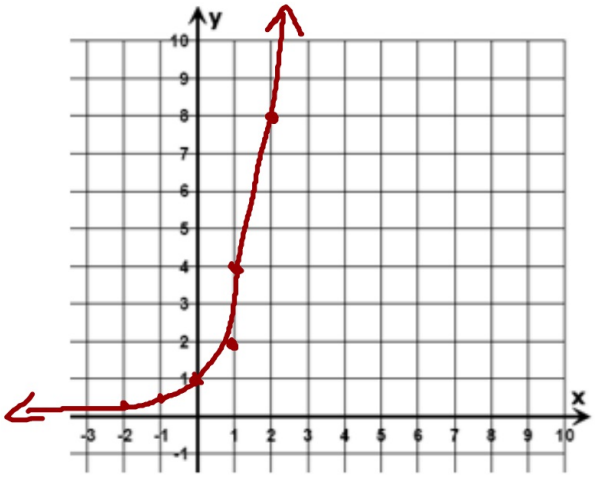
$f(x) = b^x$

Where x is negative

To graph exponential functions, make a table, plot the points and connect them with a smooth curve.

$f(x) = 2^x$

x	2^x	f(x)
-2	$2^{-2} = \frac{1}{2^2}$	$\frac{1}{4}$
-1	$2^{-1} = \frac{1}{2^1}$	$\frac{1}{2}$
0	2^0	1
1	2^1	2
2	2^2	4
3	2^3	8

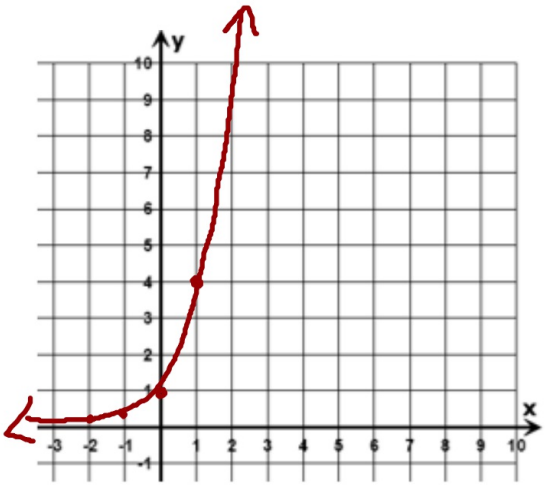


x-intercept: N/A

y-intercept: (0,1)

$f(x) = 4^x$

x	4^x	f(x)
-2	$4^{-2} = \frac{1}{4^2}$	$\frac{1}{16}$
-1	$4^{-1} = \frac{1}{4}$	$\frac{1}{4}$
0	4^0	1
1	4^1	4
2	4^2	16
3	4^3	64

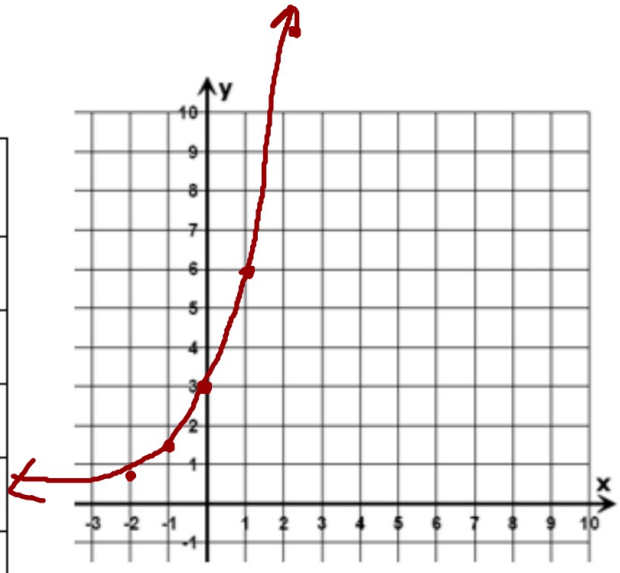


x-intercept: NA

y-intercept: (0,1)

$f(x) = (3)2^x$

x	2^x	$\cdot 3$	f(x)
-2	$\frac{1}{4}$	$\frac{1}{4} \cdot 3$	$\frac{3}{4}$
-1	$\frac{1}{2}$	$\frac{1}{2} \cdot 3$	$\frac{3}{2}$
0	1	$1 \cdot 3$	3
1	2	$2 \cdot 3$	6
2	4	$4 \cdot 3$	12
3	8	$8 \cdot 3$	24



x-intercept: N/A

y-intercept: (0, 3)

The equation **$f(x)=(a)b^{(x-h)}+k$** is the translation function that helps us understand how changing values impacts the resulting graph.

h tells us about horizontal movement. * opposite of h

If **h is positive**... move right

If **h is negative**... moves left

a tells us about stretching, reflecting, and compressing.

If **a < 0**... reflect

If **a > 1**... vertical stretch

If **0 < a < 1**... vertical compression

k tells us about vertical movement.

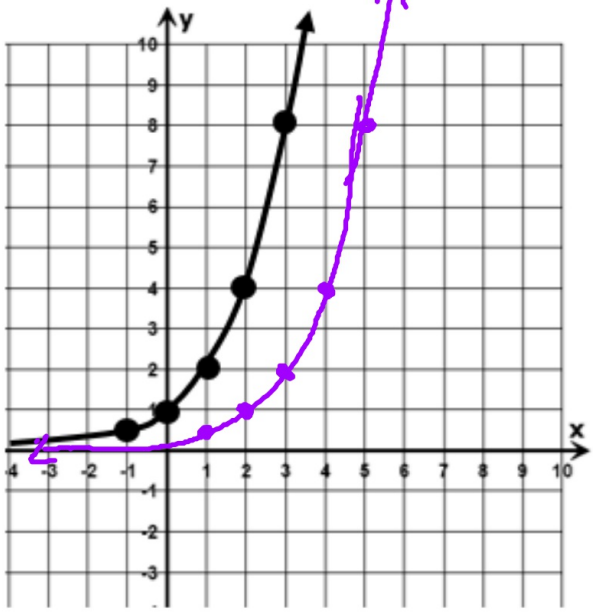
If **k is positive**... Shift up

If **k is negative**... Shift down

Given the graphed parent function $f(x)=2^x$, perform the following translations.

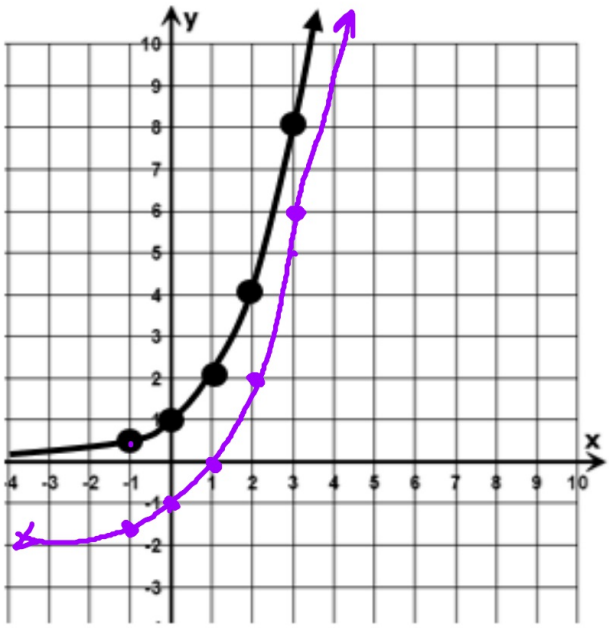
h=2

$$f(x) = 2^{x-2}$$



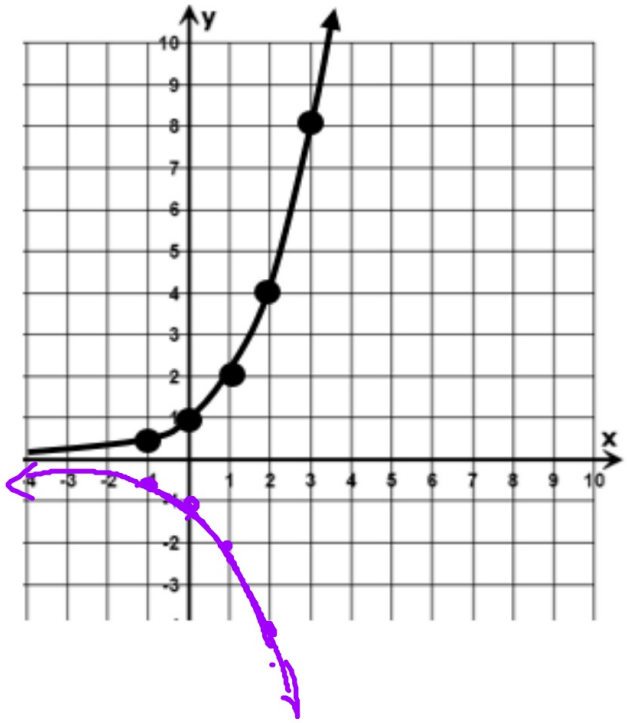
k=-2

$$f(x) = 2^x - 2$$



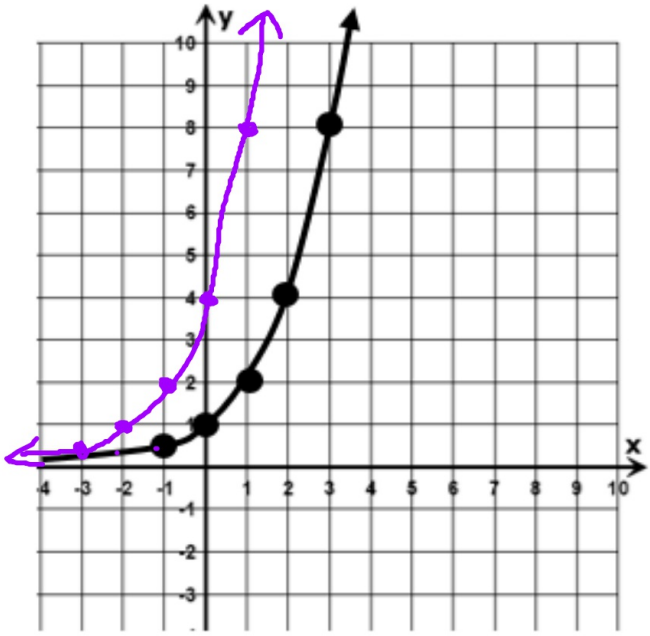
reflecting

$f(x) = (-1)2^x$



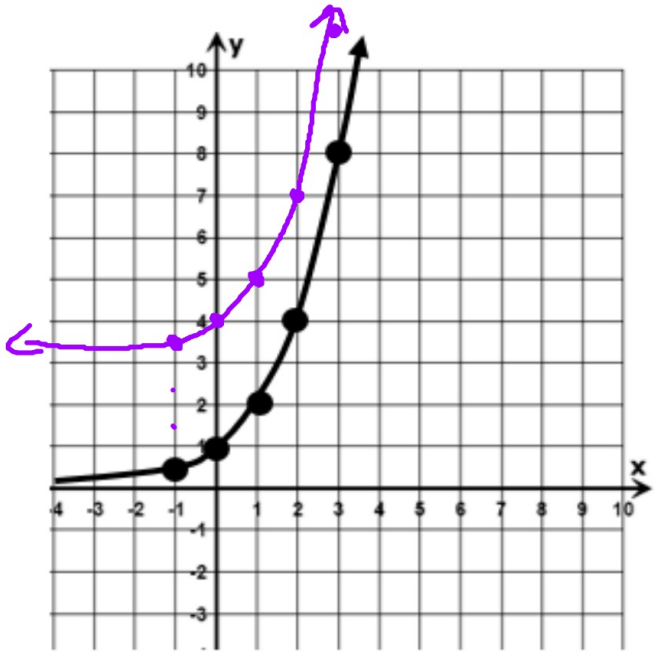
h = -2

$f(x) = 2^{x+2}$



$f(x) = 2^x + 3$

$k = 3$



$f(x) = (-2)2^x$

reflect

vertical stretch

$2^{-1} = \frac{1}{2} \cdot -2 = -1$

$2^0 = 1 \cdot -2 = -2$

$2^1 = 2 \cdot -2 = -4$