Warm-up Day 12: Transformations - The Effect of *h*

Graph the following functions on the same coordinate plane. You will use these graphs to help you determine the effect of *h* on an exponential function. The parent graph is $y = 3^x$ and you will explore the effect of $y = 3^{x \pm h}$.

1) $y = 3^x$

x	f(x)
-1	1/3
0	1
1	3
2	9

2) $y = 3^{x+2}$

x	f(x)
-3	1/3
-2	1
-1	3
0	9

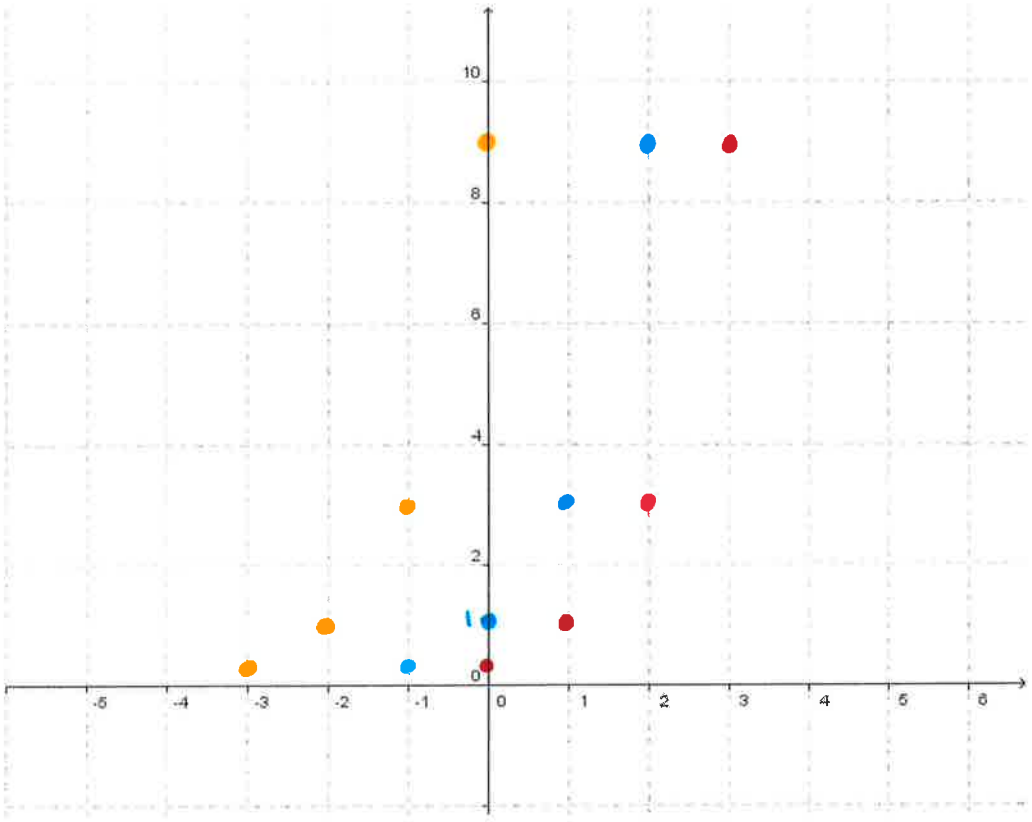
3) $y = 3^{x-1}$

x	f(x)
0	1/3
1	1
2	3
3	9

4) How does *h* affect the graph of the equation?

adding moves the graph left

subtracting moves the graph right



Warm-up Day 13: Transformations - The Effect of *k*

Graph the following functions on the same coordinate plane. You will use these graphs to help you determine the effect of *k* on an exponential function. The parent graph is $y = 4^x$ and you will be determining the effect of $y = 4^x \pm k$.

1. $y = 4^x$

x	f(x)
-1	1/4
0	1
1	4
2	16

2. $y = 4^x + 2$

x	f(x)
-1	2.25
0	3
1	6
2	18

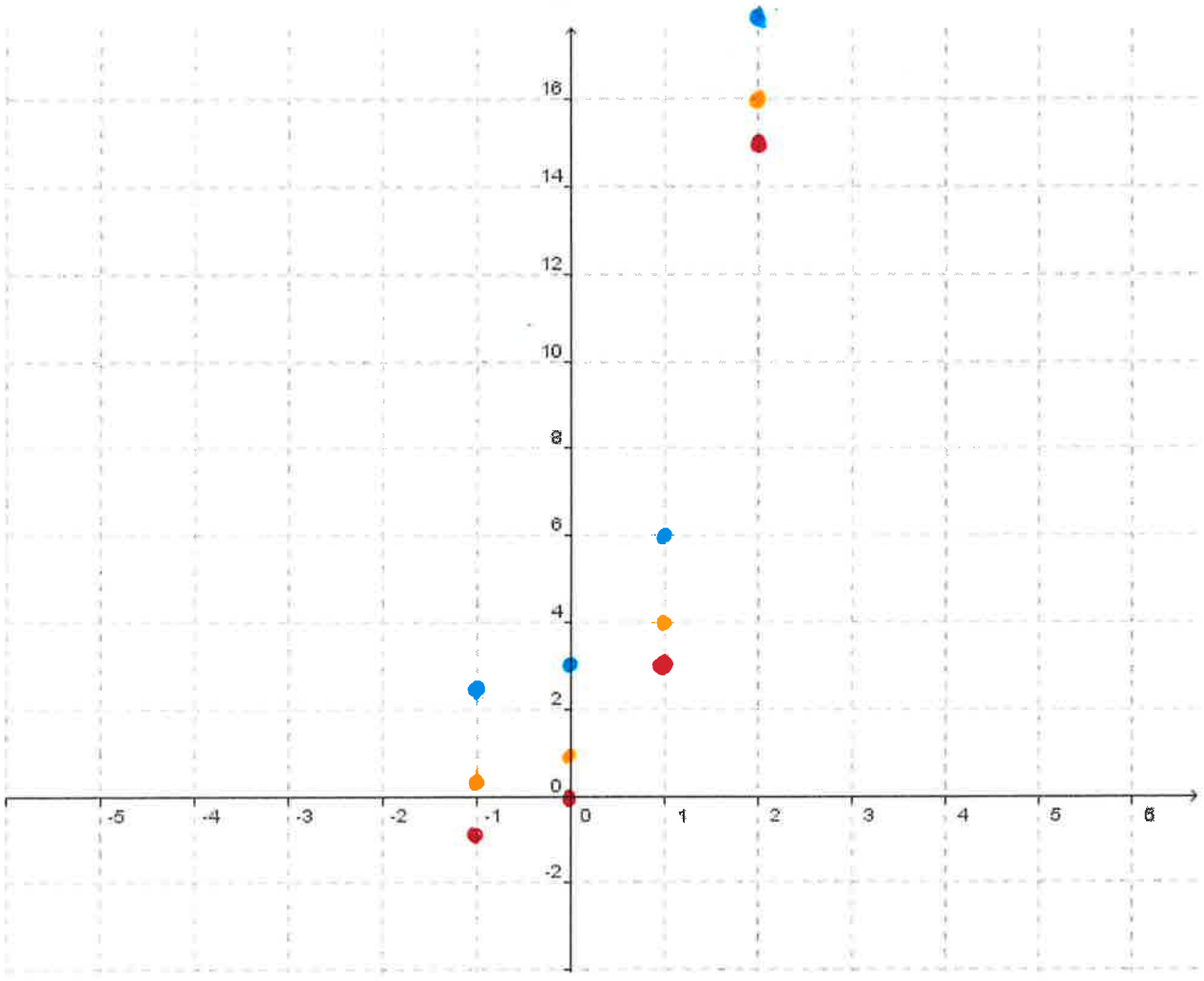
3. $y = 4^x - 1$

x	f(x)
-1	-3/4
0	0
1	3
2	15

4. How does *k* affect the graph of the equation?

adding moves the graph up

subtracting moves the graph down

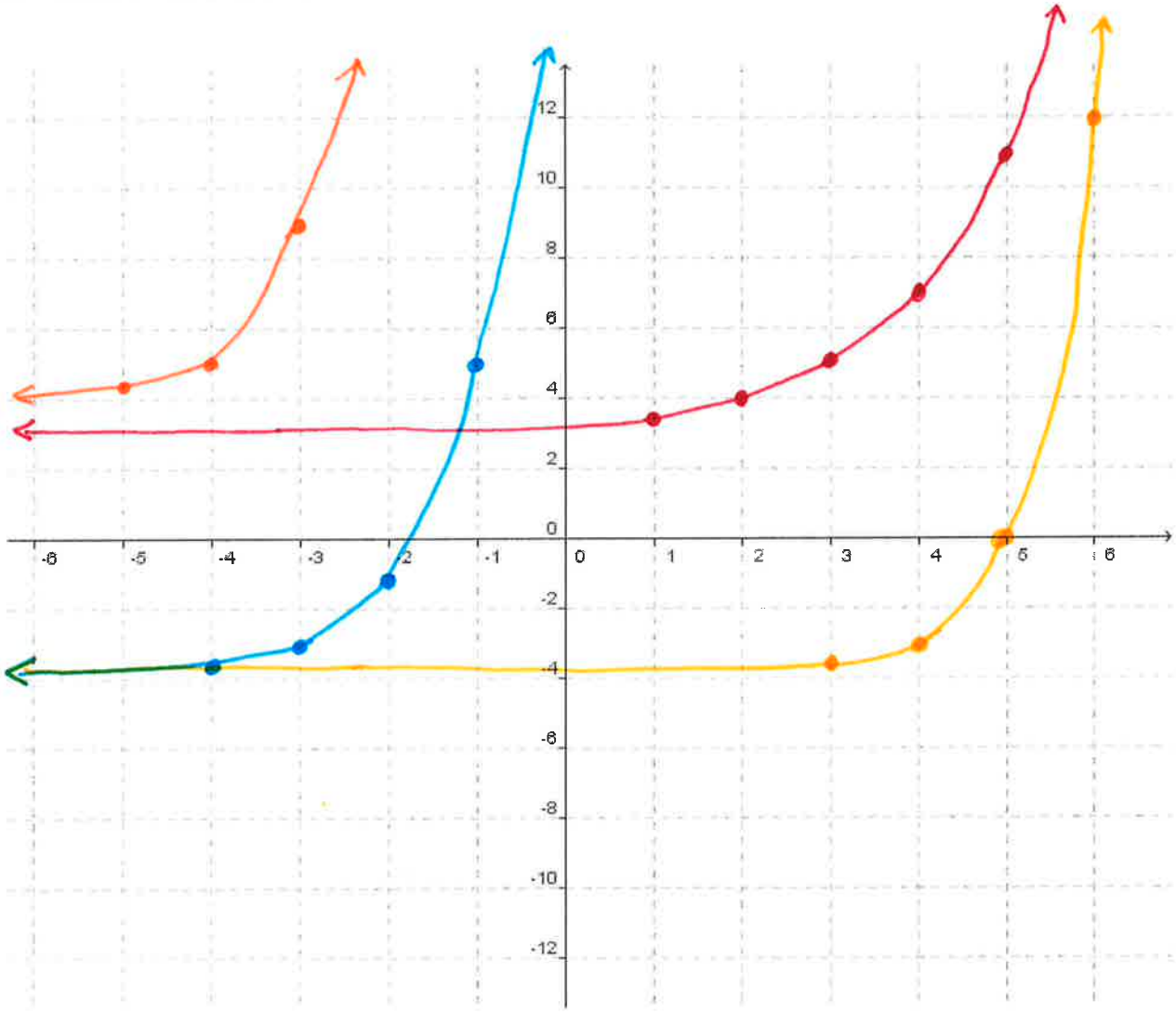


Warm-up Day 14: Transformations – Effects of both h and k

Describe the transformations used to obtain the graph of g from the graph of f.

1. $f(x) = 2^x$ $g(x) = 2^{x-2} + 3$ — f(x) is moved 2 right & 3 up
2. $f(x) = 3^x$ $g(x) = 3^{x+3} - 4$ — f(x) is moved 3 left & 4 down
3. $f(x) = 4^x$ $g(x) = 4^{x-4} - 4$ — f(x) is moved 4 right & 4 down
4. $f(x) = 5^x$ $g(x) = 5^{x+4} + 4$ — f(x) is moved 4 left & 4 up

5. Graph the $g(x)$ in 1-4.

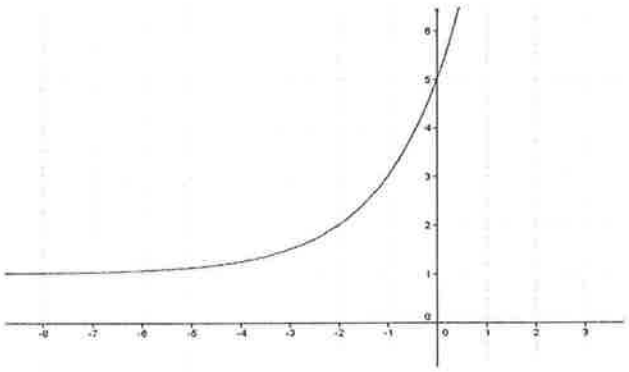


Warm-Up Day 15: Transformations - Writing the Translated Equation from Graphs

Equations From Exponential Graphs

To write an equation from an exponential graph:

1. You will be given the value of the base.
2. Identify the asymptote.
3. Identify the y-intercept.
4. Write the equation using the asymptote.
5. From the y-intercept, determine if you need to add anything to the x in the exponent.
6. Determine the direction of the graph. This will add negatives to the equation.



Base : 2

Parent Function $y = 2^x$ (because the base is 2)

Asymptote: y = 1 (the graph never crosses this line)

Equation with Asymptote: $y = 2^x + 1$ (add the asymptote to the end for the vertical shift)

Y-intercept: (0, 5)

Determine the Exponent Value: $5 = 2^0 + 1$ (plug in the y-intercept)

Note, this equation doesn't work with 0 as the exponent (you'd get 5 = 2). In order to get 5 on the left, we determine what to add or subtract to the zero in the exponent to make the equation work.

To help with this, subtract the 1 from both sides.

$$4 = 2^0$$

If zero alone won't work, what exponent can you give to 2 to get a value of 4 when evaluated? ...2!

So your equation will be $y = 2^{x+2} + 1$

Double check by plugging in the y-intercept once more...

$$5 = 2^{0+2} + 1$$

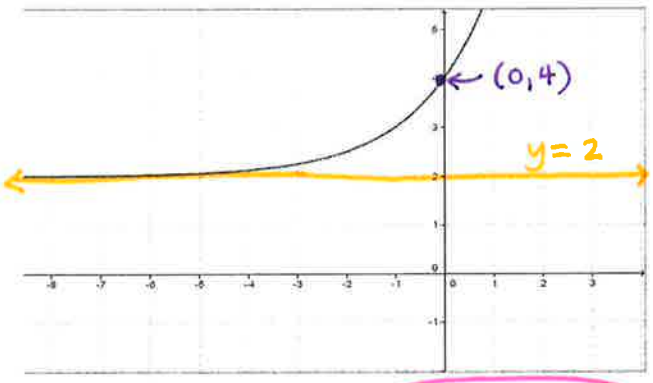
$$5 = 2^2 + 1$$

$$5 = 4 + 1$$

$$5 = 5$$

We did it!!

Determine the equation of the following functions. All functions are base 2.

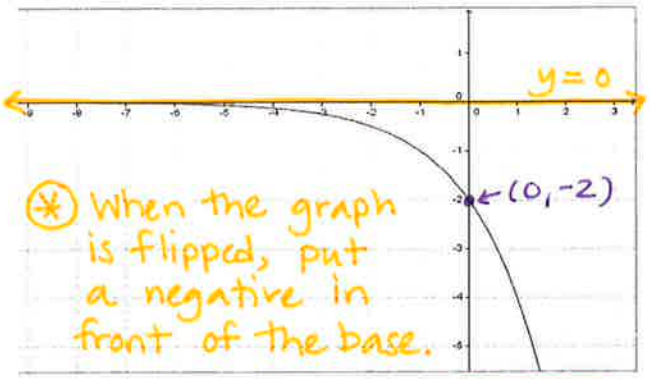


$y = 2^x + 2$

$4 = 2^x + 2$

$2 = 2^x$ $\quad x = 1$

$y = 2^{x+1} + 2$

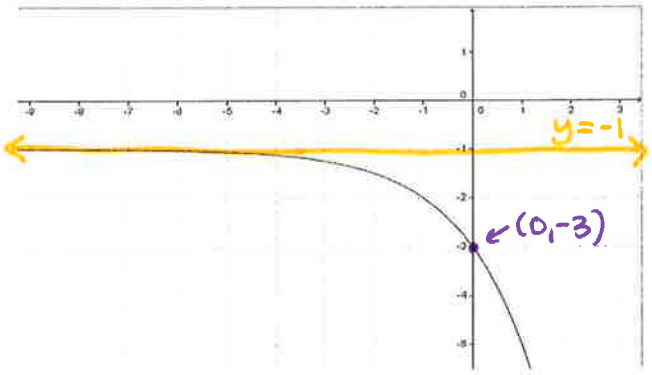


✳ When the graph is flipped, put a negative in front of the base.

$y = -2^x$

$-2 = -2^x$ $\quad x = 1$

$y = -2^{x+1}$

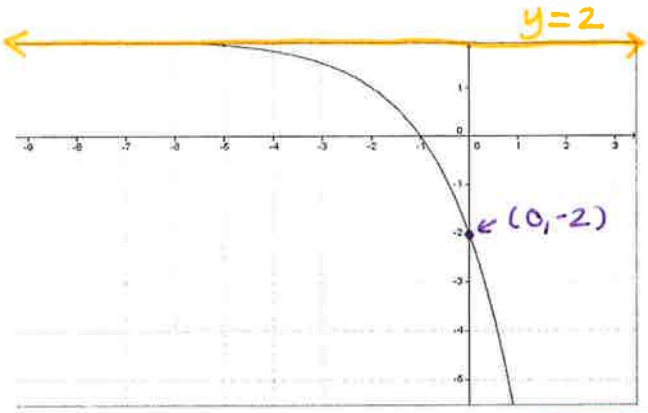


$y = -2^x - 1$

$-3 = -2^x - 1$

$-2 = -2^x$ $\quad x = 1$

$y = -2^{x+1} - 1$

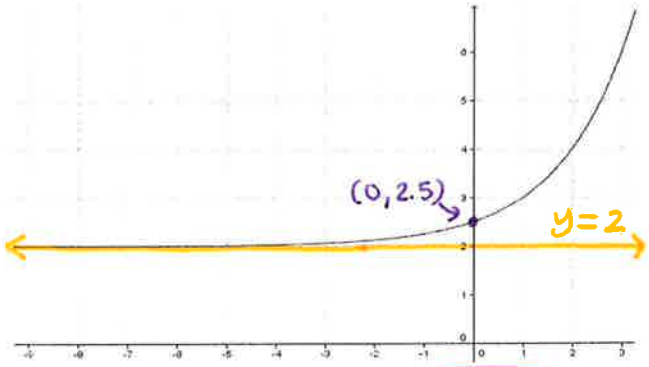


$y = -2^x + 2$

$-2 = -2^x + 2$

$-4 = -2^x$ $\quad x = 2$

$y = -2^{x+2} + 2$

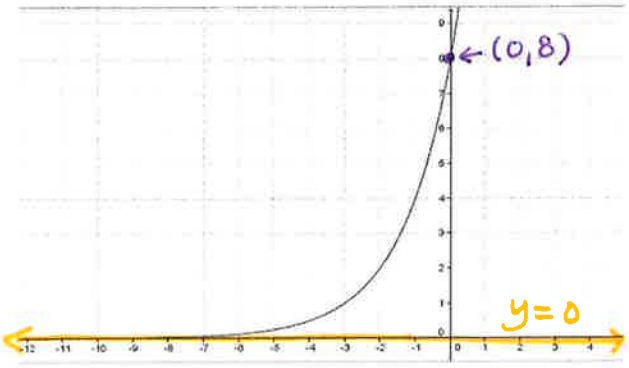


$y = 2^x + 2$

$2.5 = 2^x + 2$

$.5 = 2^x$ $\quad x = -1$

$y = 2^{x-1} + 2$



$y = 2^x$

$8 = 2^x$ $\quad x = 3$

$y = 2^{x+3}$