

## Day 3: Graphing Exponential Functions

Name: \_\_\_\_\_

## Practice Assignment

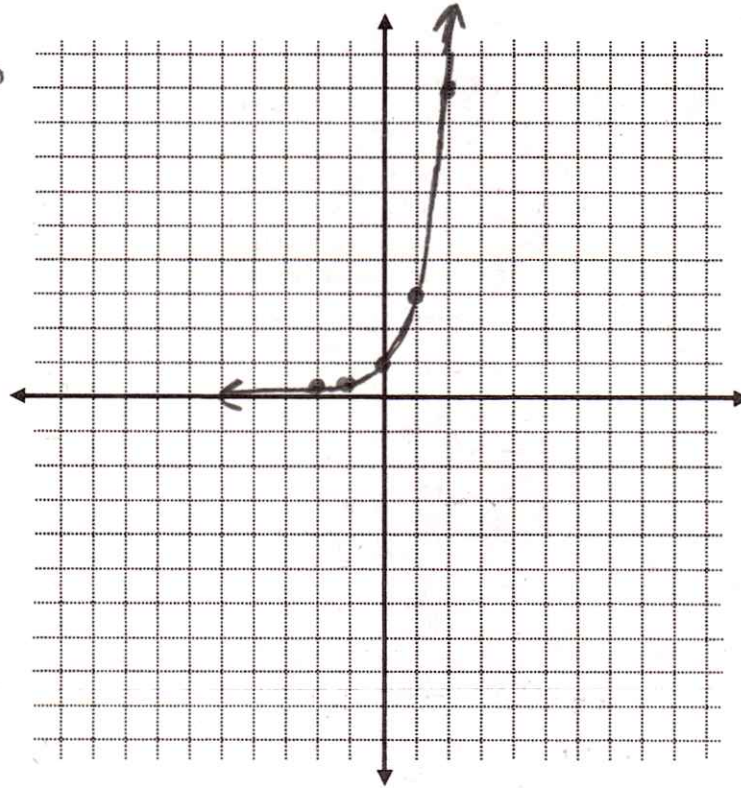
Graph the functions. Then state the y-intercept and asymptote.

1.  $f(x) = 3^x$   
 $a=1$   $b=3$   $h=0$   
 $k=0$

x	y
-2	.11
-1	.33
0	1
1	3
2	9

y-intercept:  $a+k \rightarrow 1$   
 $(0, 1)$

asymptote:  $k$   
 $y=0$

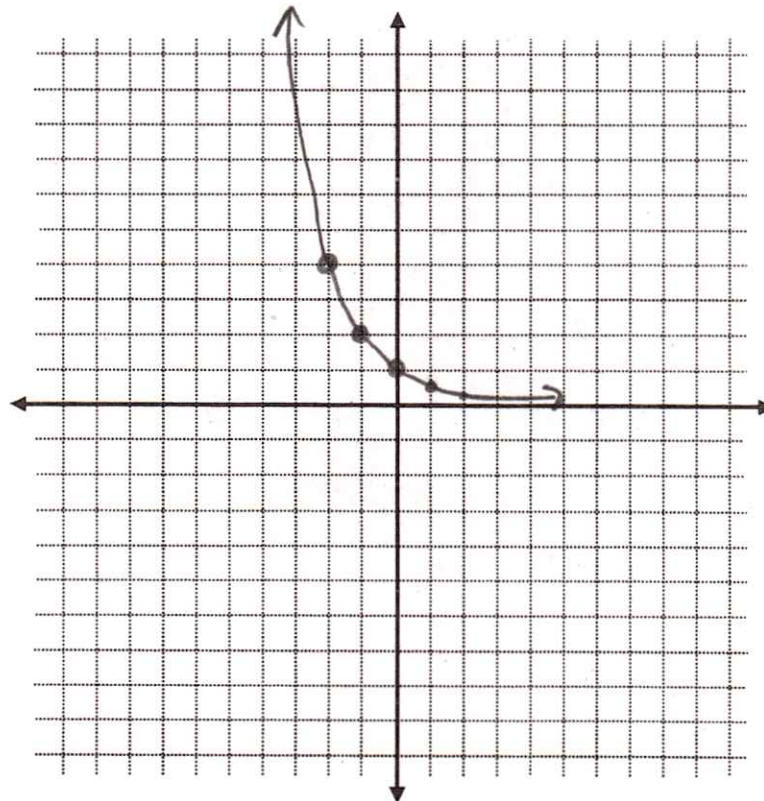


2.  $f(x) = 0.5^x$

x	y
-2	4
-1	2
0	1
1	.5
2	.25

y-intercept:  $a+k \rightarrow 1$   
 $(0, 1)$

asymptote:  $k$   
 $y=0$



3.  $f(x) = \frac{1}{3}(3)^x$

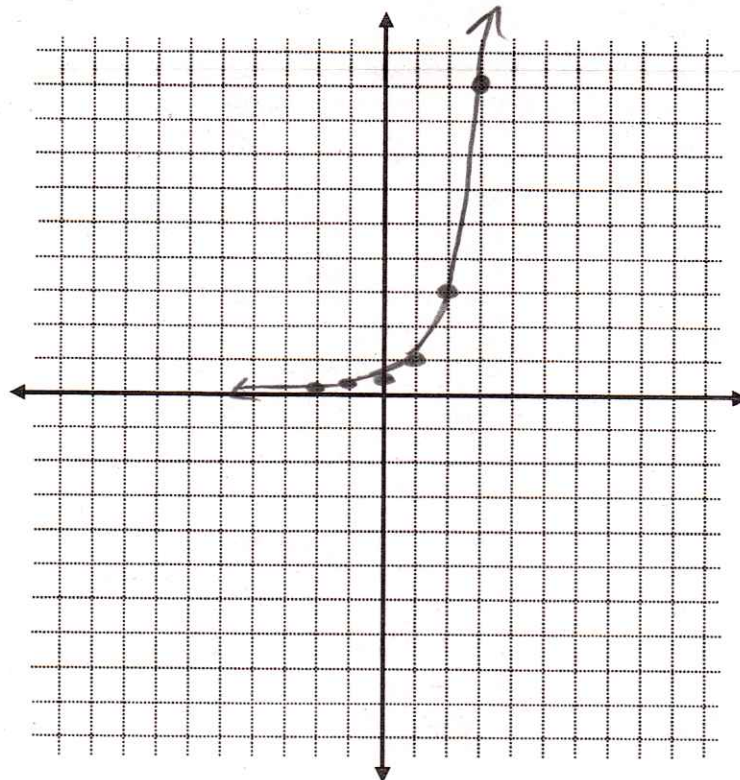
x	y
-2	.04
-1	.11
0	.33
1	1
2	3

y-intercept:  $a+k \rightarrow \frac{1}{3}$

$(0, \frac{1}{3})$

asymptote:  $k$

$y=0$



4.  $f(x) = 2(\frac{1}{4})^x$

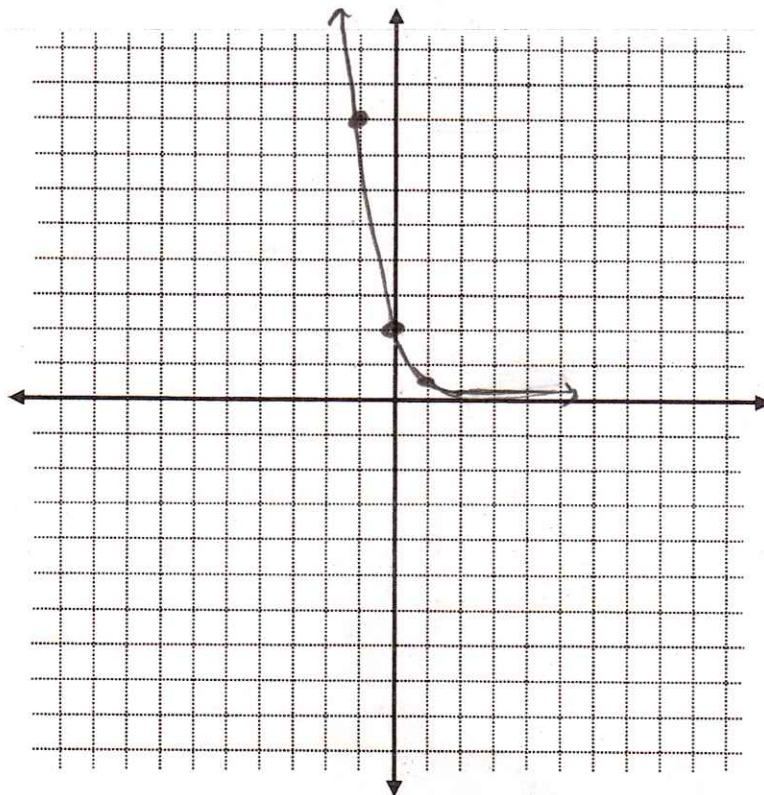
x	y
-2	32
-1	8
0	2
1	.5
2	.125

y-intercept:  $a+k$

$(0, 2)$

asymptote:  $k$

$y=0$





Day 1: Transforming Exponential Functions Practice (h & k)

Name: \_\_\_\_\_

Practice Assignment

**Directions:** Describe the transformations from the given function to the transformed function. Then name the y-intercept and asymptote.

1.  $f(x) = 2^x \rightarrow f(x) = 2^{x-2}$

Transformations:

$b=2$  growth  
 $h=2$  right 2

Y-intercept:  $a+k$   
 $(0, 1)$

Asymptote:  $k$   
 $y=0$

2.  $y = \frac{1}{2}(8)^x \rightarrow y = \frac{1}{2}(8)^x + 6$

Transformations:

$k=6$  up 6

Y-intercept:  $\frac{1}{2} + 6 \rightarrow (0, 6.5)$

Asymptote:  $k$   
 $y=6$

3.  $y = 4(0.6)^x \rightarrow y = 4(0.6)^x - 3$

Transformations:

$k=-3$  down 3

Y-intercept:  $\frac{a+k}{4-3}$   $(0, 1)$

Asymptote:  $k$   
 $y=-3$

4.  $f(x) = 4^x \rightarrow f(x) = 4^{x+3} - 8$

Transformations:

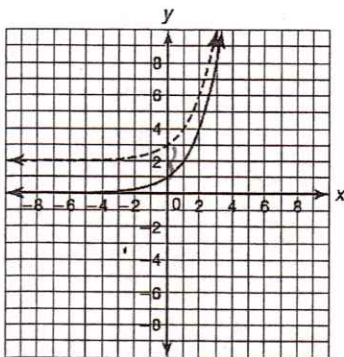
$h=-3$  left 3  
 $k=-8$  down 8

Y-intercept:  $a+k(1-8)$   $(0, -7)$

Asymptote:  $k$   
 $y=-8$

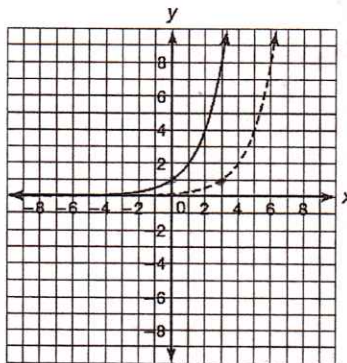
**Directions:** Using the graphs of  $f(x)$  and  $g(x)$ , described the transformations from  $f(x)$  to  $g(x)$ .  $f(x)$  is the solid line and  $g(x)$  is the dotted line.

5.



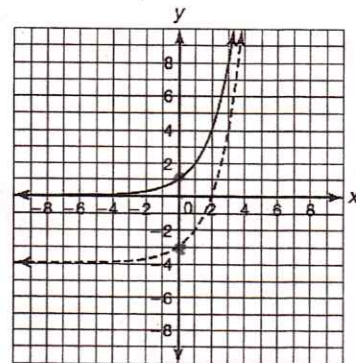
up 2 units  
 $(k=2)$

6.



right 3  
 $(h=3)$

7.



down 4  
 $(k=-4)$

**Directions:** Using the function  $g(x) = 4^x$ , create a new function  $h(x)$  given the following transformations:

8. down 3 units

$$k = -3$$

$$h(x) = 4^x - 3$$

9. right 8 units

$$h = 8$$

$$h(x) = 4^{x-8}$$

10. up 4 units and left 2 units

$$h = -2 \quad k = 4$$

$$h(x) = 4^{x+2} + 4$$

11. left 5 units

$$h = -5$$

$$h(x) = 4^{x+5}$$

12. up 2 units

$$k = 2$$

$$h(x) = 4^x + 2$$

13. down 1 unit and right 4 units

$$h = 4 \quad k = -1$$

$$h(x) = 4^{x-4} - 1$$

## Day 3: Transformations of Functions

Name: \_\_\_\_\_

## Practice Assignment

For the following functions, name all the transformations and then give the y-intercept, asymptote, and whether it is growth or decay:

Function	Transformations	Y-intercept (0, a+k)	Asymptote y=k	Growth/Decay
a. $y = 3(2)^x$	$a=3$ stretch by 3	(0, 3)	$y=0$	$b=2$ growth
b. $y = 5\left(\frac{1}{4}\right)^x - 4$	$a=5 \rightarrow$ stretch by 5 $k=-4 \rightarrow$ down 4	(0, 1) $5-4 \rightarrow 1$	$y=-4$	$b=\frac{1}{4}$ decay
c. $y = \frac{1}{2}(2)^x - 6$	$a=\frac{1}{2}$ shrink by $\frac{1}{2}$ $k=-6$ down 6	(0, -5.5) $\frac{1}{2}-6 \rightarrow -5.5$	$y=-6$	growth
d. $y = -7\left(\frac{1}{3}\right)^x + 2$	$a=-7$ reflect stretch by -7 $k=2$ up 2	(0, -5) $-7+2 \rightarrow -5$	$y=2$	decay
e. $y = 2\left(\frac{1}{4}\right)^x$	$a=2$ stretch by 2	(0, 2)	$y=0$	decay
f. $y = \frac{1}{4}\left(\frac{3}{2}\right)^x + 1$	$a=\frac{1}{4}$ shrink by $\frac{1}{4}$ $k=1$ up 1	(0, 1.25) $\frac{1}{4}+1 \rightarrow 1.25$	$y=1$	growth $\frac{3}{2} \rightarrow 1.5$
g. $y = -3(5)^x + 4$	$a=-3$ reflect stretch by 3 $k=4$ up 4	(0, 1) $-3+4 \rightarrow 1$	$y=4$	growth
h. $y = 4(2)^{x-3} - 6$	$a=4$ stretch by 4 $h=-3$ left 3 $k=-6$ down 6	(0, -2) $4-6 \rightarrow -2$	$y=-6$	growth
i. $y = 3\left(\frac{1}{2}\right)^{x-1} + 1$	$a=3$ stretch by 3 $h=1$ right 1 $k=1$ up 1	(0, 4) $3+1 \rightarrow 4$	$y=1$	decay



**Directions:** For each of the following transformations, create a function that would represent those transformations. The base function is given for each set.

1. Base Function:  $y = 2^x$

a.  $k=5$   
Up 5 units

$$y = 2^{x+5}$$

b.  $h=-2$   
Left 2 units

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

c.  $a=-$   $h=4$   
Reflected over the x-axis and right 4 units

$$y = -2^{x-4}$$

2. Base Function:  $y = \frac{1}{2}^x$

a.  $k=-6$   
Down 6 units

$$y = \frac{1}{2}^{x-6}$$

b.  $a=\frac{1}{4}$   
Shrunk by a factor of  $\frac{1}{4}$

$$y = \frac{1}{4} \left(\frac{1}{2}\right)^x$$

c.  $a=-$   $\& 3$   
Reflected over x-axis and stretch by factor of 3

$$y = -3 \left(\frac{1}{2}\right)^x$$

3. Base Function:  $y = 0.4^x$

a.  $h=2$   
Right 2 units

$$y = 0.4^{x-2}$$

b.  $a=-$   
Reflected over x axis

$$y = -(0.4)^x$$

c.  $k=4$   $h=-7$   
Up 4 units and left 7 units

$$y = 0.4^{x+7} + 4$$

**Directions:** For each of the following functions, describe the transformations:

a.  $f(x) \rightarrow 2f(x)$

Stretch of 2

b.  $f(x) \rightarrow f(x-3)$

right 3

c.  $f(x) \rightarrow f(x)-2$

down 2

d.  $f(x) \rightarrow -\frac{3}{4}f(x)$

reflect  
shrink  $\frac{3}{4}$

e.  $f(x) \rightarrow f(x+3)-5$

left 3  
down 5

f.  $f(x) \rightarrow \frac{1}{2}f(x+2)+1$

Shrink by  $\frac{1}{2}$   
left 2  
up 1

g.  $f(x) \rightarrow -f(x)+9$

reflect  
up 9

h.  $f(x) \rightarrow 3f(x-6)+4$

Stretch by 3  
right 6  
up 4