

8.3 - 8.3 Review

Name: Key Hour: _____

1) Determine whether each equation represents exponential growth or exponential decay. What percent increase or decrease does the function model?

a. $y = 70(0.50)^x$

50% ↓

b. $y = 12(1.34)^x$

34% ↑

c. $y = 0.7(0.45)^x$

55% ↓

d. $y = 25(1.019)^x$

1.9% ↑

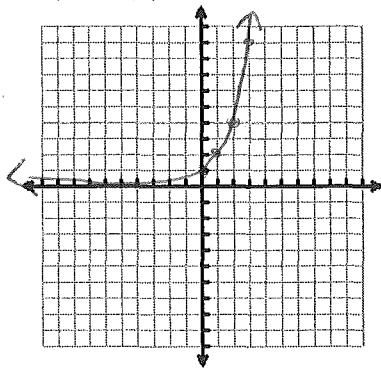
2) Sandy invests \$5000 at an annual rate of 7.2% compounded continuously. How much would be in her account after 30 years?

$5000 e^{-0.072 \times 30} = \$161,198.30$

3) Graph the parent of each function, and then shift to graph the function given. List what the transformations are and where the asymptote is.

Make sure each graph clearly shows the asymptote and at least 3 to 4 points.

a. $y = (2)^x$

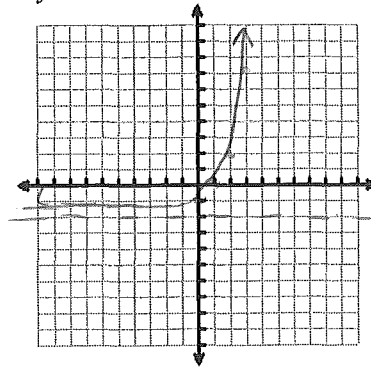


HA: $y = 0$

x	y
-2	1/4
-1	1/2
0	1
1	2
2	4

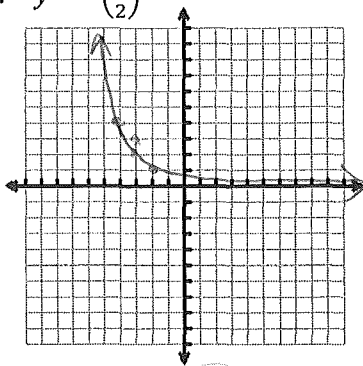
b. $y = 2^{x-2}$

down 2



HA: $y = -2$

c. $y = (\frac{1}{2})^{x+2}$



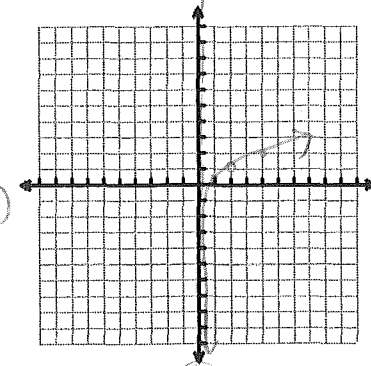
left 2

$y = 0$

x	y
-2	1
-1	1/2
0	1/4
1	1/8
2	1/16
-3	2
-4	4

d. $y = \log_2(x)$

$2^y = x$

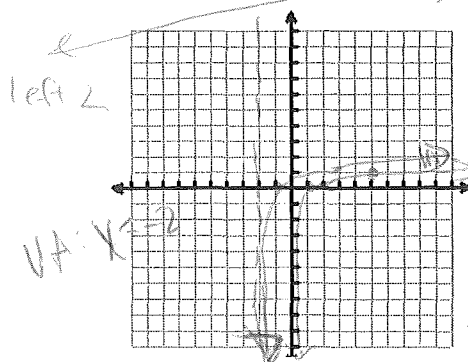


VA $x = 0$

x	y
1/4	-2
1/2	-1
1	0
2	1
4	2

e. $y = \log_5(x+2)$

parent: $y = \log_5 x$
 $5^y = x$

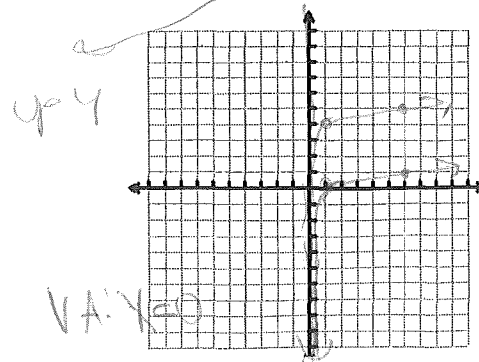


VA: $x = -2$

x	y
1/5	-2
1/5	-1
1	0
5	1
25	2

f. $y = \log_6(x+4)$

parent



up 4

VA: $x = -4$

$y = \log_6 x$

$6^y = x$

x	y
1/6	-2
1/6	-1
1	0
6	1
36	2

- 4) For the years 2000-2005, the median price of a single-family home in the United States can be approximated by the exponential function $A = 227,200(1.087)^t$ where t is the number of years after the year 2000. What is the growth rate of housing prices for this period? What is the median price of a house in the year 2005?

$$227,200(1.087)^5 = \$344,791.10$$

- 5) Iodine-123 is used in thyroid scans. It has a half-life of 12 hours. Write the exponential decay function for a 45-mg sample. Find the amount remaining after 50 hours.

$$45\left(\frac{1}{2}\right)^{50/12} = 2.51 \text{ mg}$$

- 6) Write an exponential function $y = ab^x$ for a graph that includes the given points.

a. (1,12) and (3,108)

b. (0,8) and (1,4)

$$12 = ab^1 \quad 108 = \frac{12}{b} b^3$$

$$\frac{12}{b} = a \quad 108 = 12b^2$$

$$8 = ab^0 \quad 4 = 8b^1$$

$$8 = a \quad \frac{4}{8} = b$$

$$\frac{1}{2} = b$$

$$4 = a \quad 3 = b$$

$$y = 4(3)^x$$

$$y = 8\left(\frac{1}{2}\right)^x$$

- 7) Write each equation in exponential form.

a. $\log_4 64 = 3$

b. $\log 0.1 = -1$

c. $\log_5 625 = 4$

$$4^3 = 64$$

$$10^{-1} = 0.1$$

$$5^4 = 625$$

- 8) Write each equation in logarithmic form.

a. $5^2 = 25$

b. $36^{\frac{1}{2}} = 6$

c. $4^{-1} = \frac{1}{4}$

$$\log_5 25 = 2$$

$$\log_{36} 6 = \frac{1}{2}$$

$$\log_4 \frac{1}{4} = -1$$

- 9) Evaluate each logarithm without using a calculator.

a. $\log_3 \frac{1}{27}$ $3^x = \frac{1}{27}$

b. $\log_8 16$ $8^x = 16$ $x = \frac{4}{3}$

c. $\log 1000000$

d. $\log_{\frac{1}{5}} 25$

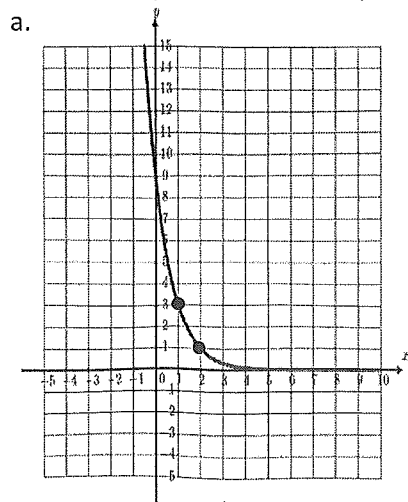
$$3^x = \frac{1}{27} \quad 3^x = 3^{-3} \quad x = -3$$

$$8^x = 16 \quad 2^{3x} = 2^4 \quad x = \frac{4}{3}$$

$$10^x = 1000000 \quad 10^x = 10^6 \quad x = 6$$

$$\left(\frac{1}{5}\right)^x = 25 \quad 5^{-x} = 5^2 \quad x = -2$$

- 10) Write the equations of the exponential functions shown in the graphs below. Hint: Use two points on the graph.



(1, 3) (2, 1)

$$3 = ab^1 \quad 1 = ab^2$$

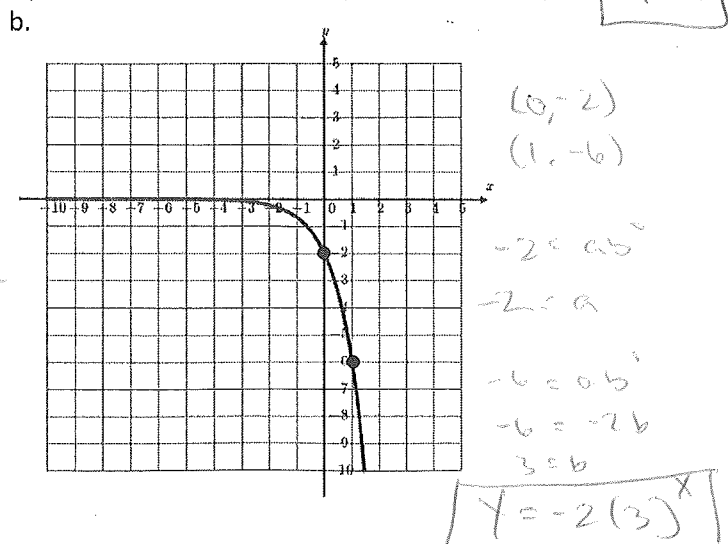
$$\frac{3}{b} = a \quad 1 = \frac{3}{b} b^2$$

$$\frac{3}{b} = a \quad 1 = 3b$$

$$\frac{1}{3} = a \quad \frac{1}{3} = b$$

$$a = a$$

$$y = 9\left(\frac{1}{3}\right)^x$$



(0, -2) (1, -6)

$$-2 = ab^0 \quad -2 = a$$

$$-6 = ab^1 \quad -6 = -2b$$

$$3 = b$$

$$y = -2(3)^x$$

11) The half-life of Zinc-71 is 2.4 minutes. If one had 100.0 g at the beginning, how many grams would be left after 7.2 minutes has elapsed?

$$12.5 \text{ g}$$

12) If I purchase a boat at \$42,000 where the value of it depreciates by 9% each year, how much will the boat be worth in 8 years?

$$\$ 19,750.61$$

13) If I plant one tree today, and the amount of trees triples every year, how many trees would I have in 13 years?

$$1,594,323$$

14) If I purchase my wife a diamond ring for \$2200 and 12 years later sell it for \$9535.95, what was the percent increase? (don't rush this one 😊)

$$9535.95 = 2200(b)^{12}$$

$$4.3345 = b^{12}$$

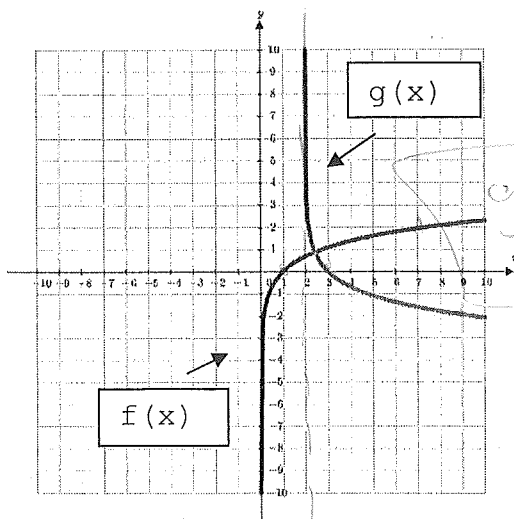
$$b = 1.13$$

13% inc

15) The number of Rare Red-Nosed Rhinoceros has been inclining over the recent years. When I first conducted the study, there were only 248 in the entire world. Since then they have been exponentially increasing at a rate of 1.8% per year. How many can we expect 15 years from now?

$$248(1.018)^{15} \rightarrow 324.09$$

16.



If $f(x)$ is the function $y = \log x$, describe the transformations that occurred to arrive at $g(x)$, then write the equation.

$$g(x) = -\log(x - 2)$$

