

Ch7A KEY

Wednesday, November 6, 2019 2:34 PM

1. Describe the transformations and graph the base function AND the transformed function below – include mapping notation and the completed table of values. (3 marks each)

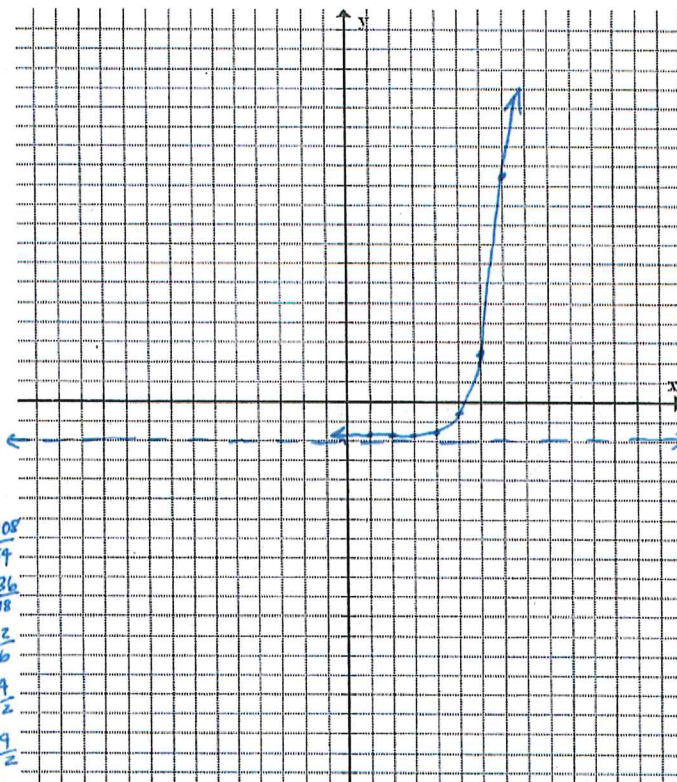
a. $y = 3^x$ and $y = \frac{1}{2}(3)^{x-4} - 2$

Describe the transformations:

- ① VC $\frac{1}{2}$
 ② 4 right, 2 down

$y = 3^x$

x	y
-3	$\frac{1}{27}$
-2	$\frac{1}{9}$
-1	$\frac{1}{3}$
0	1
1	3
2	9
3	27



x	$\frac{1}{2}y$
-3	$\frac{1}{54}$
-2	$\frac{1}{18}$
-1	$\frac{1}{6}$
0	$\frac{1}{2}$
1	$\frac{3}{2}$
2	$\frac{9}{2}$
3	$\frac{27}{2}$

x+4	$\frac{1}{2}y-2$
1	$\frac{-107}{54}$
2	$\frac{-35}{18}$
3	$-\frac{11}{6}$
4	$-\frac{3}{2}$
5	$-\frac{1}{2}$
6	$\frac{5}{2}$
7	$\frac{23}{2}$

State the domain and range: $\{x | x \in \mathbb{R}\}, \{y | y > -2, y \in \mathbb{R}\}$

State the equation of the asymptote:

$y = -2$

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

Describe the transformations:

- ① HE d 2
- ② 3 right, 2 up

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

x	y
-3	27
-2	9
-1	3
0	1
1	$\frac{1}{3}$
2	$\frac{1}{9}$
3	$\frac{1}{27}$

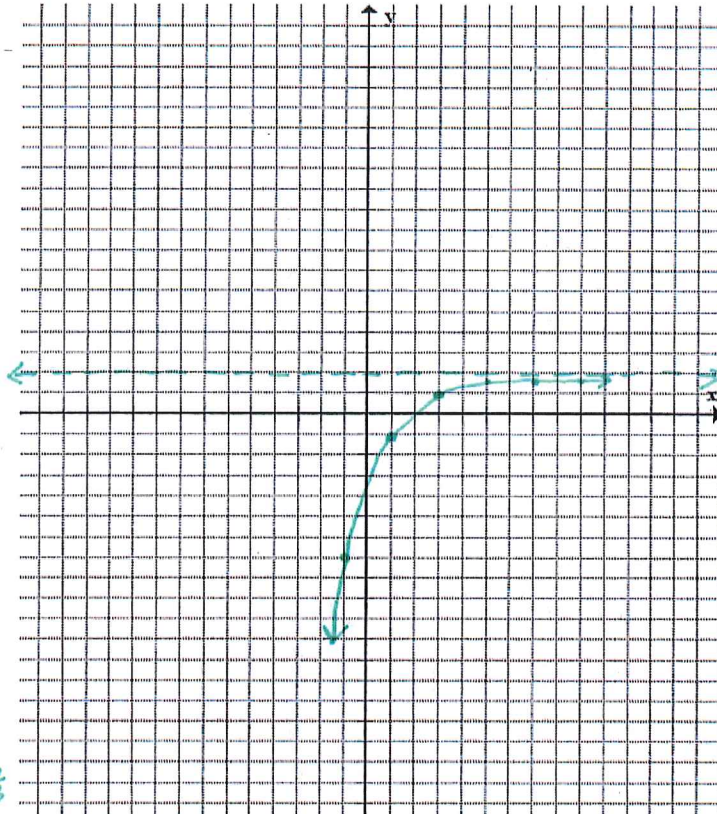
2x	-y
-6	-27
-4	-9
-2	-3
0	-1
2	$-\frac{1}{3}$
4	$-\frac{1}{9}$
6	$-\frac{1}{27}$

2x+3	-y+2
-3	-25
-1	-7
1	-1
3	1
5	$\frac{5}{3}$
7	$\frac{17}{9}$
9	$\frac{56}{27}$

$+\frac{1}{3}$

$+\frac{10}{9}$

$+\frac{57}{27}$



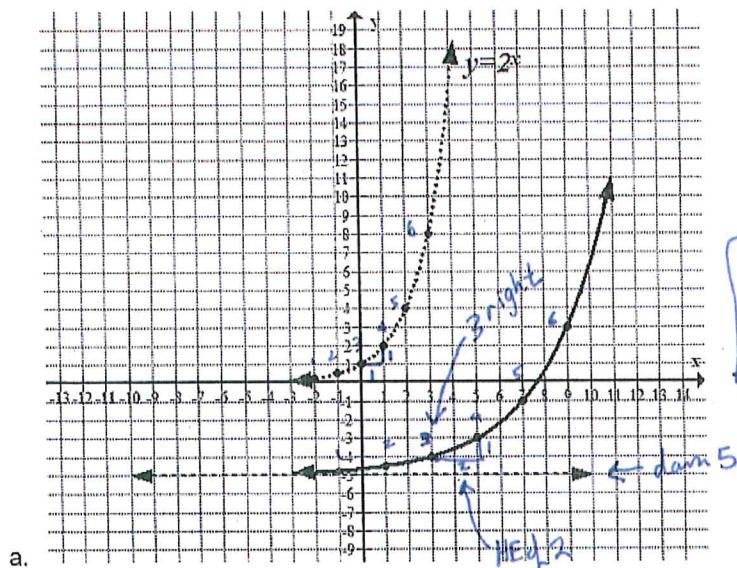
State the domain and range:

$\{x \mid x \in \mathbb{R}\}$ $\{y \mid y < 2, y \in \mathbb{R}\}$

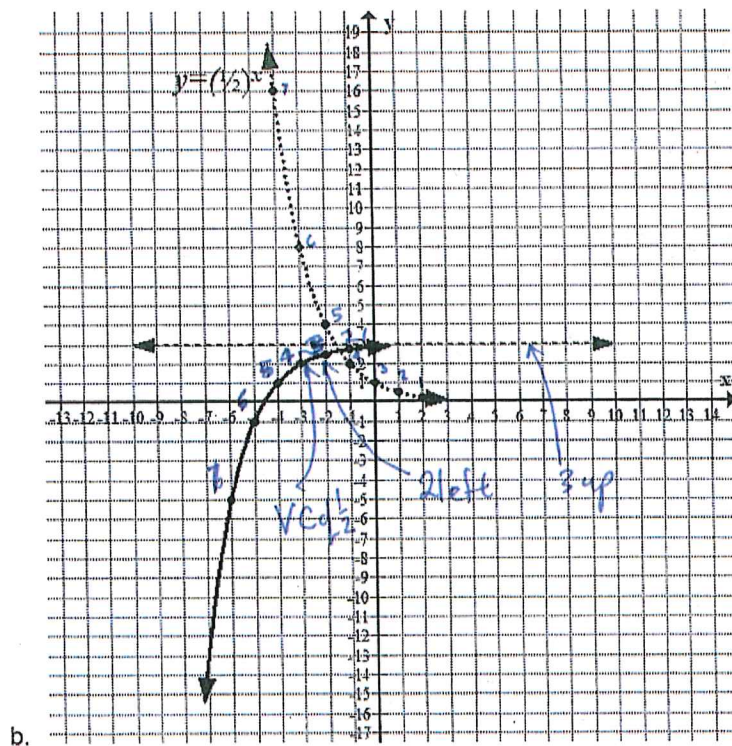
State the equation of the asymptote:

$y = 2$

2. Write an equation for each of the transformed graphs below. The base function is given. (1 mark each)



$$y = 2^{\frac{1}{2}(x-3)} - 5$$



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

3. Write the equation of each function with the given transformations: (1 mark each)

- a. $f(x) = \left(\frac{1}{4}\right)^x$ is stretched vertically by a factor of 3, stretched horizontal by a factor of $\frac{1}{2}$, reflected in the y-axis, and translated 2 right and 1 down.

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

- b. $y = 6^x$ is stretched vertically by a factor of $\frac{1}{2}$, reflected in the y-axis, and translated 5 left and 7 down.

$$y = \frac{1}{2} (6)^{-(x+5)} - 7$$

4. Solve each of the following algebraically. (hint: change to the common base) (2 marks)

a. $16^{2x-3} = 32^{x+2}$

$$(2^4)^{2x-3} = (2^5)^{x+2}$$

$$8x - 12 = 5x + 10$$

$$3x = 22$$

$$x = \frac{22}{3}$$

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

$$(3^2)(3^3)^{x-1} = (3^{-1})^{4-2x}$$

$$3^2 + 3x - 3 = -4 + 2x$$

$$3x - 1 = -4 + 2x$$

$$3x - 1 = -4 + 2x$$

$$x = -3$$

c. $\left(\frac{1}{25}\right)^x = 5^x (125)^{x+1}$

$$(5^{-2})^x = 5^x \cdot (5^3)^{x+1}$$

$$5^{-2x} = 5^x \cdot 5^{3x+3}$$

$$-2x = x + 3x + 3$$

$$-2x = 4x + 3$$

$$-6x = 3$$

$$x = -\frac{1}{2}$$

$$A = A_0 (b)^{t/n}$$

5. Given the following information, determine an exponential equation that represents the growth or decay. (1 mark each)

a. A 5.3 gram sample of Carbon-14 that decays and has a half-life of 5740 years.

$$A = 5.3 \left(\frac{1}{2}\right)^{t/5740}$$

b. The growth rate of mold cells that triple every 5 days. Assume you start with one cell.

$$A = (3)^{t/5}$$

c. The population of Langley increases by 0.5% per year with a current population of 127,000 people.

$$A = 127000 (1 + 0.005)^t$$

$$A = 127000 (1.005)^t$$

d. The percent of light that is lost with every 2 meter depth in a lake is 25%.

$$A = 1.00 (1 - 0.25)^{d/2}$$

$$A = (0.75)^{d/2}$$

6. Determine how much more intense and earthquake of Magnitude 9.4 on the Richter scale would be in comparison to an earthquake of Magnitude 3.7 on the Richter scale. (1 mark)

$$I = I_0 (10)^{R_1 - R_2}$$

$$I = (10)^{9.4 - 3.7}$$

$$I = 10^{5.7}$$

$$I = 501,187.23 \text{ times more intense}$$

