LC Math I

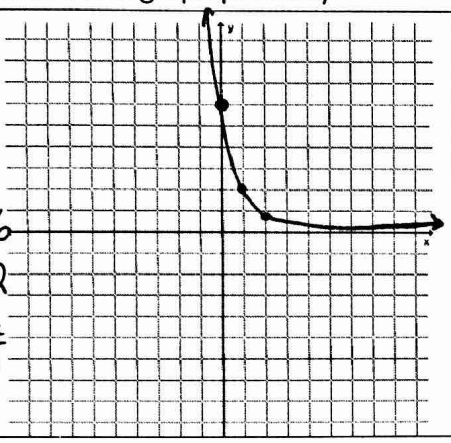
Name:

7.1 - Exponential Functions Sample Problems

Make a table of values and graph precisely

$y = 6\left(\frac{1}{3}\right)^x$

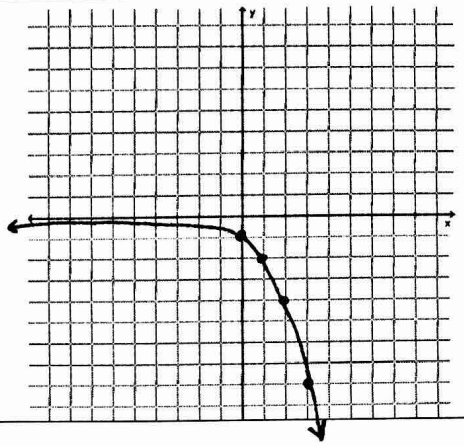
x	y
0	$6(\frac{1}{3})^0 = 6$
1	$6(\frac{1}{3})^1 = 2$
2	$6(\frac{1}{3})^2 = \frac{2}{3}$



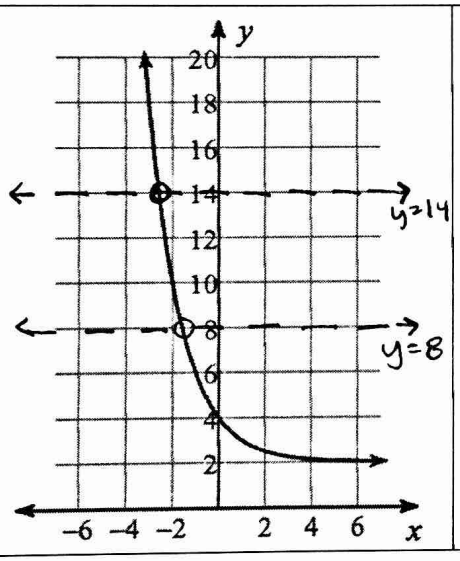
$y = -2^x$

$y = -1 \cdot 2^x$

x	y
-1	$-\frac{1}{2}$
0	-1
1	-2
2	-4
3	-8



B. Analyze the following exponential function: $y = 2\left(\frac{1}{2}\right)^x + 2$



Domain: $\mathbb{R}$

Range: $y > 2$

Increasing or Decreasing

Positive or Negative

End Behavior:

As $x \to +\infty$, $y \to 2$

As $x \to -\infty$, $y \to +\infty$

Using the graph, estimate the solution to the following equations:

$2\left(\frac{1}{2}\right)^x + 2 = 14$ about... $x \approx -2.5$ (see graph at left)

$2\left(\frac{1}{2}\right)^x + 2 = 8$ $x \approx -1.8$

C. Write a function equation that correctly models each description, then answer the question.

Let $x =$ *the number of hours since 2 pm* and $y =$ *the number of bacteria in a sample.*

At 2 pm, the population in the sample is 700. It increases by 200 bacteria every hour. How many bacteria will be in the sample at 11 pm?

$y = 700 + 200x$ | $y = 700 + 200(9)$ | $y = 2500$ bacteria

At 2 pm, the population in the sample is 1000. It triples every hour. How many bacteria will be in the sample at 5 pm?

$y = 1000(3)^x$ | $y = 1000(3)^3$ | $y = 27000$ bacteria

At 2 pm, the population of the sample was 300. The population decreases by 31% each hour. How many bacteria will be in the sample at midnight?

$y = 300(0.69)^x$ | $y = 300(0.69)^{10}$ | $y \approx$ about 7 bacteria

At 2 pm, the population of the sample was 900. The population increases by 7.2% each hour. How many bacteria will be in the sample at 8 pm?

$y = 900(1.072)^x$ | $y = 900(1.072)^6$ | $y \approx 1366$ | about 1366 bacteria

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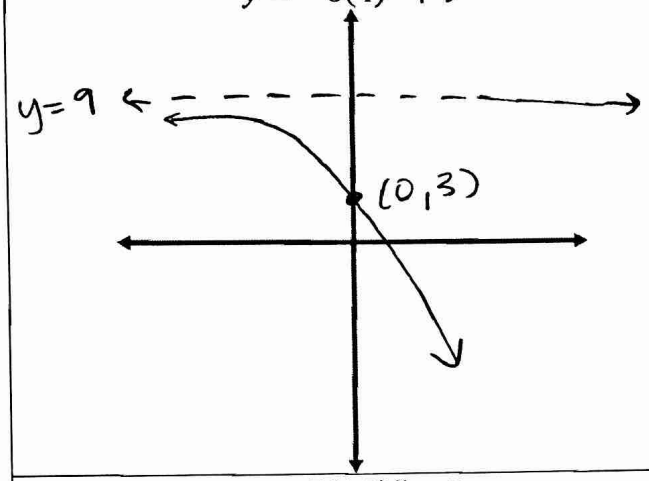
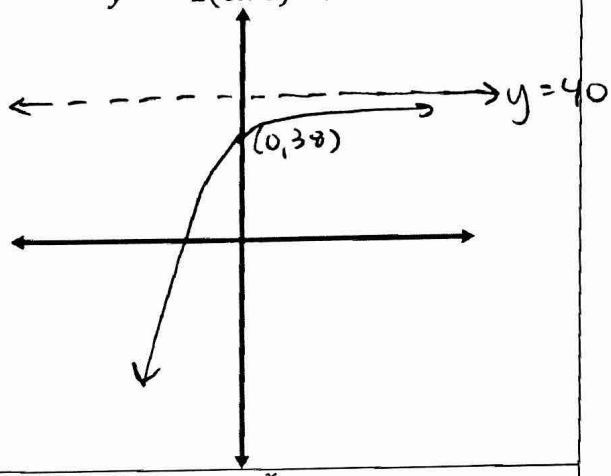
D. Sketch the graphs of the following functions. Label the asymptote and y-intercept and make sure that the general shape and end behavior are correctly drawn:

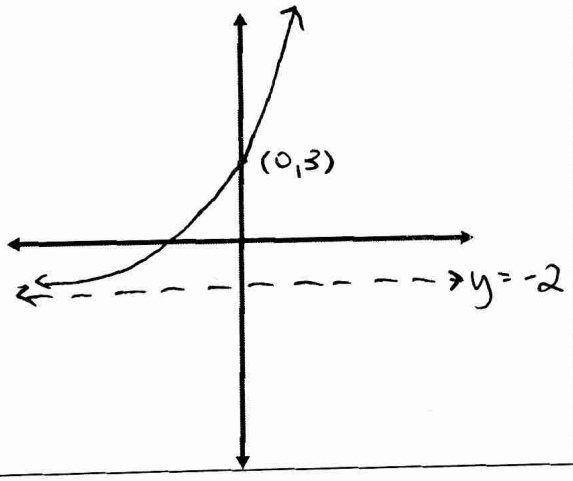
$y = -6(4)^x + 9$



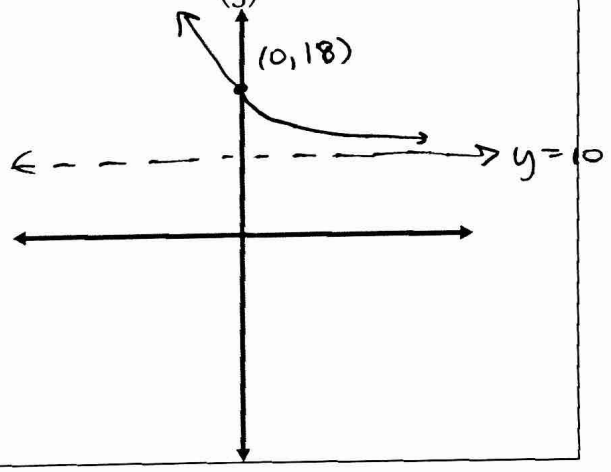
$y = -2(0.78)^x + 40$



$y = 5(1.8)^x - 2$



$y = 8\left(\frac{2}{3}\right)^x + 10$



E. Solve by creating common bases

$2^x \cdot 2^{x-5} = 8^{2x+1}$

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

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

$2x-5 = 6x+3$

$-5 = 4x+3$

$-8 = 4x$

$\boxed{-2 = x}$

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

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

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

$3^{-x} = 3^{x+1+2x}$

$-x = 3x+1$

$-4x = 1$

$\boxed{x = -1/4}$