Warm Up 2/11/19

1. The total cost, in dollars, of membership in a fitness center is given by the function c(m)=20m + 40, where m is the number of months a person is a member. In dollars, how much is the cost of a membership for 1 year?

12 months

$c(m) = 20m+40$

$20(12)+40$

$240+40$

$\$280.00$

2. What is the value of x in the system of equations below:

$5x + 4y = 1$

$y = 1 - x$

$5x + 4(1-x) = 1$

$5x + 4 - 4x = 1$

$x + 4 = 1$

$-4 \quad -4$

$x = -3$

3. What is the equation of the line that is perpendicular to the graph of 4x + 3y = 9 and passes through (-2,3)?

$4x + 3y = 9$

$-4x \quad -4x$

$\frac{3y}{3} = \frac{-4x+9}{3}$

$y = -\frac{4}{3}x + 3$

$m = \frac{3}{4}$

$(-2,3)$

$y - y_1 = m(x - x_1)$

$y - 3 = \frac{3}{4}(x+2)$

$y - 3 = \frac{3}{4}x + \frac{3}{2} \quad \frac{3}{2} + \frac{6}{2}$

$+3 \quad +3$

$y = \frac{3}{4}x + \frac{9}{2}$

Linear versus Exponential Functions

Linear and exponential functions share many characteristics. This is because they are based on two different, but similar, sets of principles.

LINEAR VERSUS EXPONENTIAL

Linear functions are based on adding/subtracting the same amount

The slope (m) – Constant rate of change- Common difference d

Exponential functions are based on multiplying by the same amount

The base (b)- Growth or decay factor- Common Ratio r

$y = mx + b$ $y = a(b)^x$

***Example* #1:** The two tables below represent a linear function and an exponential function.

Part 1 : Which type is each function below? Explain how you arrive at your answer.

TABLE 1

x	0	1	2	3	4
y	5	10	20	40	80

(2) (2) (2) (2)

Type _____

Exponential

$y = 5(2)^x$

TABLE 2

x	0	1	2	3	4
y	8	11	14	17	20

+3 +3 +3 +3

Type _____

Linear

$y = 3x + 8$

Part 2 **:** Find equations in standard form for each of the functions from *Example* #1.

Table 1 Equation : _____

Table 2 Equation : _____

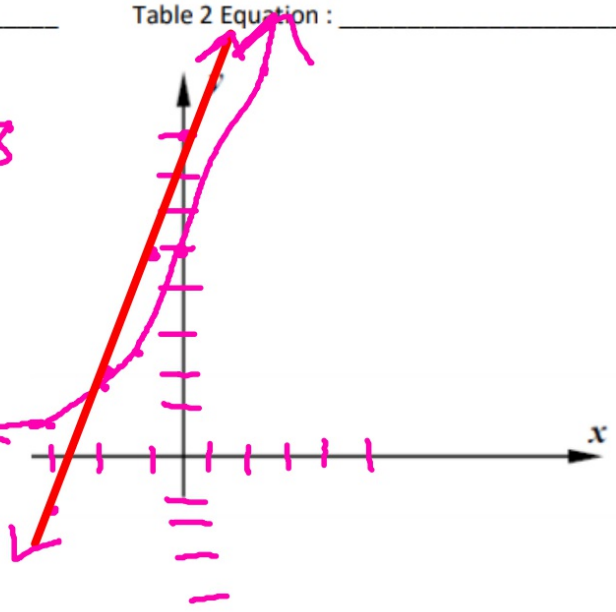
Part 3 **:** Sketch the graph of each equation

$y = 5(2)^x$

x	y
-3	5/8
-2	5/4
-1	5/2
0	5
1	10
2	20

$y = 3x + 8$

x	y
-3	-1
-2	2
-1	5
0	8
1	11
2	14



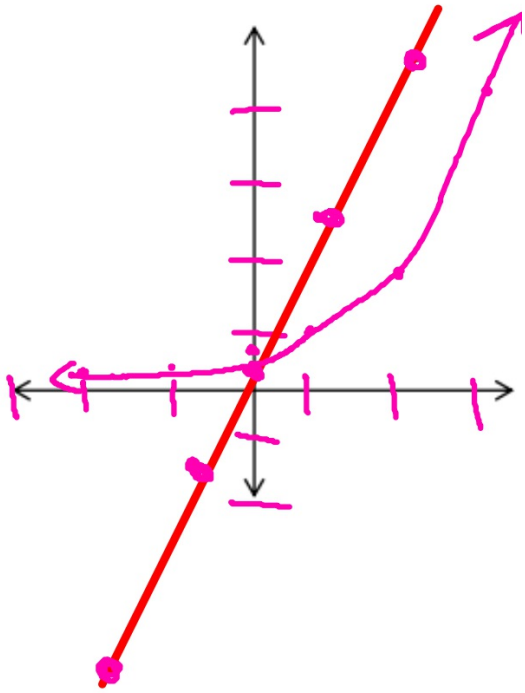
Example 2: Consider the linear function $y = 20x + 5$ and the exponential function $y = 5(2)^x$. Make a sketch of their graphs. Which one of these grows faster?

$y = 20x + 5$

x	y
-2	-35
-1	-15
0	5
1	25
2	45

$y = 5(2)^x$

x	y
-2	$5/4$
-1	$5/2$
0	5
1	10
2	20



Example 3

Which of the following functions would best describe the data in the table?

(1) $y = 10x + 2$ linear

(2) $y = 8x + 2$ linear

(3) $y = 5(2)^x$ exp.

(4) $y = 2(5)^x$ exp.

x	0	1	2	3	4
y	2	10	50	250	1250

(5) (5) (5) (5)

$y = a(b)^x$

Example 4: Find the equation of the exponential function, in $y = a(b)^x$ form for the function given in the table below.

x	0	1	2	3	4
y	10	30	90	270	810

$y = 10(3)^x$

$y = 10(3)^x$

Linear functions grow slowly while exponential functions grow faster

rapidly
quickly
quicker

Example 5: Write an equation of the function represented in the table below.

x	−1	0	1	2	3	4
f(x)	$\frac{2}{3}$	2	6	18	54	162

(3) (3) (3) (3) (3)

Type exponential Equation $y = 2(3)^x$

$y = mx + b$

Example 6: Write an equation of the function represented in the table below.

x	–3	–2	–1	0	1	2
f(x)	5.5	5	4.5	4	3.5	3

$-.5$ $-.5$ $-.5$ $-.5$ $-.5$

Type linear Equation _____

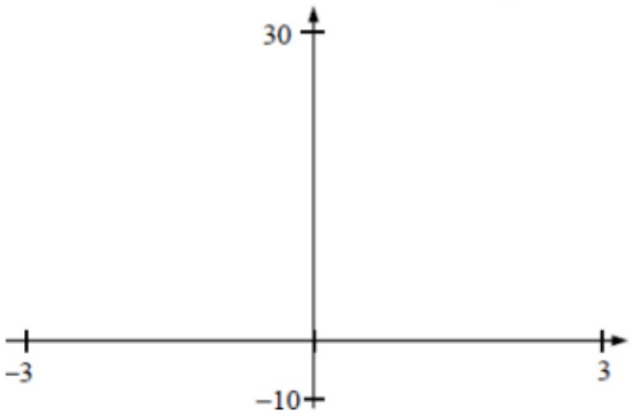
$y = -\frac{1}{2}x + 4$

REASONING. You can determine the equation of a line or the equation of an exponential given any two points that lie on these curves. In this exercise we will pick two special points. Consider the points (0, 5) and (1,15)

a. Write the equation of the line that passes between these two points in $y = mx + b$ form.

b. Write the equation of the exponential that passes between these two points in

c. Using your calculator, sketch the two graphs on the axes below. Label with their equations



d. Is it fair to say that an exponential function always grows faster than a linear?

e. What can we say about an increasing exponential function when compared with an increasing linear function?

f. What is the difference between the way a linear function increases and the way an exponential function increases?

(10) $y = a(b)^x$ $(1-r)$ $(1-.15)$

$y = 20{,}000(.85)^5$

$\boxed{\$8{,}874.11}$

(7) $y = 90(1.10)^n$

(8) $y = 500(1.032)^7$

$\$623.34$