

Linear and Exponential Models Worksheet

Name _____ Class Period _____

Linear Model: $y = mx + b$ (constant rate of change, + or - by #)
 m = rate of change (slope) & b = start value
Exponential Model: $y = ab^x$ (don't have a constant rate of change, \times or \div same #)
 a = start value & b = growth or decay rate
y-intercept

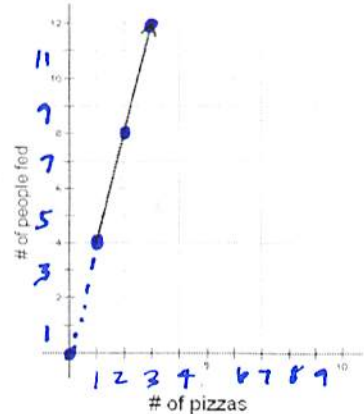
1) Katherine opens an exercise studio at the beginning of the New Year, and on January 1, she has 100 members. The table shows the membership growth from January-May. Write an equation that represents the data in the table.

Month	Count
January	100
February	125
March	150
April	175
May	200

+25
+25
+25
+25
+25

m = 25 b = 100
 $y = mx + b$
 $y = 25x + 100$

2) The graph shows the relationship between the number of pizzas and the number of people the pizzas will feed at a party. Write an equation that represents the graph. How many people will 8 pizzas feed?



m = 4 b = 0
 $y = 4x$
 $y = 4(8)$
 $y = 32$
 8 pizzas feeds
 32 people

3) A plumber charges \$50 just to show up at your house for a service call. He charges an additional \$75 for each hour he is at your house. Write an equation representing this scenario. How much will you have to pay for 3 hours worth of work?

x	y
0	50
1	125
2	200
3	275
4	350

+75
+75
+75

m = 75 b = 50
 $y = 75x + 50$
 $y = 75(3) + 50$
 $y = \$275$ for
 3 hrs.

$$y = a \cdot b^x$$

$a = \text{start value}$
 $b = \text{rate}$

- 4) Bacteria can multiply at an alarming rate when each bacteria splits into two new cells, thus doubling. For example, if we start with only one bacteria which can double every hour, by the end of one day we will have over 16 million bacteria.

x	End of Hour	1	2	3	4	5	6	7	8	9	10	11	12	13	14	...	24
y	Bacteria - starting with one	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192	16384	...	16777216

Write an equation for this scenario. Check your equation by plugging in 24 to see if you get 16,777,216.

$$a = 1$$

$$b = 2$$

$$y = 1(2)^x$$

$$y = 1 \cdot 2^x$$

$$y = 1(2)^{24}$$

$$y = 16,777,216 \text{ bacteria}$$

- 5) Each year the local country club sponsors a tennis tournament. Play starts with 128 participants. During each round, half of the players are eliminated.

x	Rounds	1	2	3	4
	Number of Players left	64	32	16	8

Write an equation for this scenario. How many players are left after 6 rounds?

$$a = 128$$

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

$$y = 128\left(\frac{1}{2}\right)^x$$

$$y = 128\left(\frac{1}{2}\right)^6$$

$$y = 2$$

After 6 rounds
2 people

- 6) A colony of insects triples every day. If the colony has 80 insects today, how many will be present in 10 days?

$$a = 80$$

$$b = 3$$

$$y = 80(3)^x$$

$$y = 80(3)^{10}$$

4,723,920
insects