Key

Unit 4 Test Review

Name Key

For numbers 1-2, write an explicit and a recursive equation and then answer the question.

1. The value of a stock when purchased was $20 a share. The stock grew at a yearly rate of 8%. What is the value of the stock after 15 years?

$f(x) =$ $20(1.08)^x$ Value of stock after 15 years $63.44

$20(1.08)^{15}$

Recursive:

$\begin{cases} a_0 = 20 \\ a_n = a_{n-1}(1.08) \end{cases}$

2. The value of a stock when purchased is $55 a share. The stock decreased at a rate of 4% yearly. How many years did it take for the stock to be worth $20.65?

$f(x) =$ $55(.96)^x$ Number of years until the stock reaches $20.65 24

$20.65 = 55(.96)^x$

Recursive:

$\begin{cases} a_0 = 55 \\ a_n = a_{n-1}(.96) \end{cases}$

3. Coffee, tea, and some soft drinks contain the drug caffeine. One hour after ingestion, 65% of the original amount of caffeine remains. At the end of each hour after that, 65% of the amount at the beginning of the hour remains. Suppose a person consumes 30 milligrams of caffeine.

The equation $y = 30(0.65)^x$ represents this situation.

a. How much caffeine would remain after 2.5 hours?

Amount of caffeine remaining: = 10.219

$30(.65)^{2.5}$

b. Estimate when 6 mg of caffeine remains.

Time when 6 mg of caffeine remain: 3.74 hours

$6 = 30(.65)^x$

c. Set up and solve an equation to find the half-life of the drug caffeine.

$15 = 30(.65)^x$ $x = 1.61$ hours

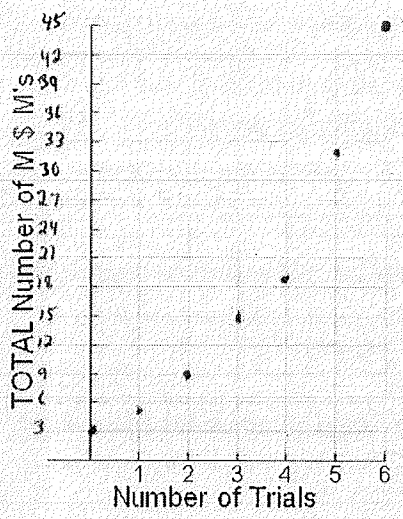
d. Describe the possible domain and range of this situation.

Domain – $x \geq 0$

Range – $0 < y \leq 30$

4. Geoff and his friend Sandra were completing an M&M activity in Math 1 class where they were collecting data by counting the remaining M&M's. **Graph** their data that is listed in the below chart:

Trial Number	Number of M&M's
0	3
1	5
2	9
3	15
4	19
5	32
6	45



a. Find the **linear regression equation** the models Geoff and Sandra's data. ***Round to the nearest hundredth.***

$y =$ 6.79x - 2.07

b. Using your linear regression, predict the number of M&M's you would have after 12 trials.

6.786(12) - 2.071 = 79.411 so 79 m+m's

c. Find the **exponential regression equation** the models Geoff and Sandra's data. ***Round to the nearest hundredth.***

$y =$ $3.32(1.57)^x$

d. Using your exponential regression, predict the number of M&M's you would have after 12 trials.

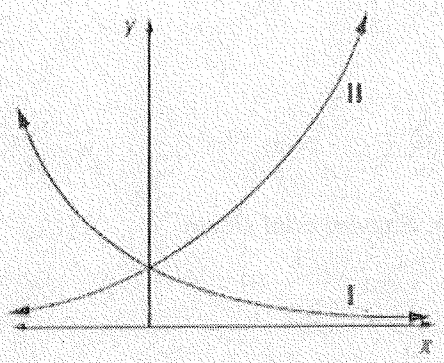
$3.32(1.57)^{12} = 744.62$ so 744 m+m

e. Will your prediction using the **linear regression equation** or the **exponential regression equation** be a better representation of the number of M&M's after 12 trials? *Explain why!!!*

Exponential would be better since the data is increasing at an increasing rate.

5. Two exponential growth and decay situation are represented by Graphs I and II and also by Tables A and B. For each graph, there is a matching table.

a. Write the number of the graph beside its corresponding table.



II A

x	1	2	3	4
y	6	12	24	48

I B

x	1	2	3	4
y	1.5	0.75	0.375	0.1875

b. The rule for Graph I in Part *a* is of the form $y = a(b)^x$. Will *b* be less than 1 or greater than 1? *Explain your answer.*

Circle your answer: Greater than 1 or Less than 1

Explanation:

$b < 1$ represents decay since you are taking a percentage away.

6. Stan can figure out how much money he has in the bank by using the following formula.

$M = 3200(1.045)^x$ (x stands for years and M stands for money)

i. How much money did Stan initially deposit in the bank?

$3200

ii. What is the interest rate of the account?

4.5%

iii. How much money will Stan have in 20 years?

$7717.48

iv. When will Stan's bank account reach about $10,050?

$x = 26$ years

v. Describe the possible domain and range of this situation.

Domain – 0, 1, 2, ...

assuming annual interest.

Range – 3200, 3344, 3494.48

7. What is the percent of decay modeled by the equation: $y = 32(0.65)^x$

Percent of decay: 35%

8. What is the percent of growth modeled by the equation: $y = 2(1.065)^x$

Percent of growth: 6.5%

9. Label the following equations with the terms ***Exponential Growth***, ***Exponential Decay***, or ***Linear***.

$y = 2(1-0.25)^x$ (.75) Exp decay

$y = 2(1+0.25)x$ linear

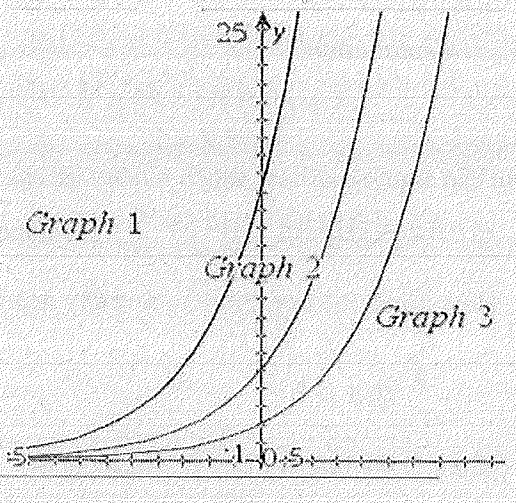
$y = 2(1+0.25)^x$ exp growth

10. Which graph matches the equation:

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

Circle your answer:

Graph 1 (Graph 2) Graph 3



11. Which equation matches Graph 2:

Circle your answer:

$y = 2(2)^x$ $y = 2(9)^x$ $y = 2(4)^x$