DO NOW

Decide whether the table represents a linear or exponential function. Then, write the function formula.

x	0	1	2	3	4	5	6	7
y	12	8	4	0	-4	-8	-12	-16

Linear or exponential? $y =$ _____

$y = -4x + 12$

$\frac{12-8}{0-1} = \frac{4}{-1} = -4$ $\frac{y_2 - y_1}{x_2 - x_1}$

Jan 2-1:01 PM

Exponential growth -- when a quantity increases by a certain factor over time.

EX: compound interest or population increase

Use the formula to find exponential growth:

$f(t) = a(1 + r)^t$

'a' is the initial amount
'r' is the rate expressed as a decimal
't' is the # of time intervals

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Kyra deposits $1000 into an account that pays 5% compound interest. How much will Kyra have in her account after 5 years?

$f(t) = a(1+r)^t$
$f(t) = 1000(1+.05)^5$
$f(t) = 1000(1.05)^5$
$f(t) = 1276.281563$
$\boxed{f(t) = \$1276.28}$

Jan 7-12:51 PM

Exponential decay -- a quantity decreases by a certain factor over time
EX: a car's value depreciating (going down) over time.

Use the formula to find exponential decay:

$f(t) = a(1 - r)^t$

EX: If your parents buy a car for $25,000 and it depreciates at a rate of 12% each year, you can find the car's value after 5 years using the formula above.

$f(t) = a(1-r)^t$
$f(t) = 25000(1-.12)^5$
$f(t) = 25000(.88)^5$
$f(t) = 13,193.29792$
$\boxed{f(t) = \$13,193.30}$

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1. The original value of an investment is $1400 and the value increases by 9% each year. Find the value of the investment after 25 years.

$f(t) = a(1+r)^t$
$f(t) = 1400(1+.09)^{25}$
$f(t) = 1400(1.09)^{25}$
$f(t) = 12072.31292$
$f(t) = \$12072.31$

2. A farmer buys a tractor for $50,000. If the tractor depreciates 10% per year, find the value of the tractor in 7 years.

$f(t) = a(1-r)^t$
$f(t) = 50000(1-.10)^7$
$f(t) = 50000(.90)^7$
$f(t) = 23914.845$
$f(t) = \$23914.85$

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3. In 1985, there were 285 cell-phone subscribers in Mayville. The number of subscribers increased by 75% per year after 1985. How many cell-phone subscribers were there in 2008?

4. The population in Haywardsville is decreasing at a rate of 2.5% each year. If the population in 2000 was 28,000, what will be the expected population in 2015 if this rate of decrease continues?

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For Exercise 4 and Exercise 5 tell whether the function is an exponential growth function or exponential decay function, and find the constant percentage rate of growth.

Exercise 4: $P(t)= 3.5(1.09)^t$

a. Exponential Decay, 3.5%
b. Exponential Decay, 9%
c. Exponential Growth, 9%
d. Exponential Growth, 10%

Exercise 5: $P(x) = 200(.85)^x$

a. Exponential Decay, 85%
b. Exponential Decay, 15%
c. Exponential Growth, 85%
d. Exponential Growth, 200%

Jan 30-9:41 AM

Example 5: The number of people who have heard a rumor often grows exponentially. Consider a rumor that starts with 3 people and where the number of people who have heard it doubles each day that it spreads.

a. Write an exponential function to represent this situation.

b. Determine the number of people who know the rumor after 20 days.

Jan 30-8:02 AM