Name: _____ Date: _____ Hour: __Alg 1__

Unit 8 Day 6: Growth Factors vs. Growth rates

Focus Question: How are growth rates and growth factors related?

A. When Rodney first got his job in 1993, he earned $21,000 per year. At the end of each year, Rodney receives a 10% raise. P stands for Rodney's pay and y stands for years since 1993.

1. Using the equation $P(y) = 21000(10)^y$, what would his salary be this year?

2020
-1993
27

$P(27) = 21000 \cdot 10^{27}$

21000,...,...,... 27 zeros

2. Do you think the equation was correct? Explain.

Nope no one will get ↑ dollars

3. If another way to write 10% is 0.1 how do you know the equation $P(y) = 21000(0.10)^y$, is also not correct?

b=0.1 0.1<1 that → decays

B. Part A should have shown you that **percent increase** and **growth factor** are NOT the same thing. **When a <u>percent increase</u> is given, it is called a <u>growth rate</u>**. Growth **rates** are used quite frequently when speaking of financial investments. The table below gives Rodney's salary for the first 5 years after 1993.

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Years since 1993	Salary in $
0	21000
1	23100
2	25410
3	27951
4	30746.10
5	33820.71

21000 • ? = 23100

1. Find the **growth <u>factor</u>** (remember factor means what did you multiply by) for Rodney's salary. Explain how you got your answer.

23100 ÷ 21000 = 1.1

2. Remember the growth rate was 10%. How are the growth rate and growth factor related?

.1 is 10% 1.1 is factor

1 + rate = factor

A formula for exponential growth is $f(x) = A(1 + r)^x$ where A is the initial value,

r is the *<u>growth rate</u>* ,

x is the number of time intervals that have passed,

(1 + r) represents the *<u>growth factor</u>* or base.

0.6% 1+0.006 1 + rate = factor rate = factor − 1

C. Growth rates and factors

1. Find the growth factor associated with each growth rate.

a. 75% 1+0.75=1.75 (factor base)

b. 15% 1+0.15=1.15

c. 30% 1+0.3=1.3

d. 100% 1+1=2 (factor)

e. 150% 1+1.5=2.5

f. 0% 1+0=1

2. Find the growth rate associated with each growth factor.

a. 1.5 1.5−1=0.5 50%

b. 1.25 1.25 − 1 / 0.25 25%

c. 1.1 1.1 − 1 / 0.1 10%

d. 1 1 − 1 / 0 0%

D. When Sam was in seventh grade, his aunt gave him a stamp worth $2500. Sam considered selling the stamp, but his aunt told him that if he saved it, it would increase in value. Sam saved the stamp and its value increased by 6% each year for several years in a row. 1+0.06

1. Write an equation for the value of Sam's stamp for any year. $V(y)=2500(1.06)^y$ y: years V: value

2. Make a table showing the value of the stamp each year for the five years after Sam's aunt gave it to him.

Year	Value
0	2500
1	2650
2	2809
3	2977.50
4	3156.20
5	3345.60

3. How many years will it take to double the value?

2500 · 2 = 5000 almost 13 yrs.

E. Mrs. Ramos started a college fund for her grandson. She used this calculation to predict the value of his fund several years from now:

Value = $2000 · 1.05 · 1.05 · 1.05 · 1.05

1. What initial value, growth rate, growth factor, and number of years is Mrs. Ramos assuming?

$2000 (initial value) 5% → 1.05 − 1 / .05 (growth factor) 4 (number of years)

2. If the value continues to increase at this rate, how much would the fund be worth in one more year?

$V(5)=2000 \cdot 1.05^5$ $2552.56