

**Review: Growth and Decay**

Determine the multiplier for each growth or decay rate (don't forget to add or subtract from 1).

1. 25% growth  
 $1 + .25 = 1.25$

2. 18% decay  
 $1 - .18 = 0.82$

3. 3% growth  
 $1 + 0.03 = 1.03$

4. 70% decay  
 $1 - .70 = 0.3$

5. 16% decay  
 $1 - .16 = 0.84$

6. 200% growth  
 $1 + 2.00 = 3.00$

- If the Percent (%) < 1, then it is Decay and the population number will go down
- If the Percent (%) > 1, then it is Growth and the population number will go up
- If the Percent (%) = 1, then there is no change and population number will stay the same.

**Finding the Multiplier for the Percent Growth or Decay (straight line method)**

New number:

Original Number:

Formula:  $1 + \left[ \frac{\text{New} - \text{Original}}{\text{Original}} \right]$  (don't forget to change the decimal to a percentage?)

Find the following multiplier then change it to the percentage of growth or decay.

1) New 70, Original 100  $1 + \frac{70 - 100}{100} = 0.7$   
decay = 0.7

2) New 23, Original 20  $1 + \frac{23 - 20}{20}$   
growth = 1.15

3) New 53, Original 78  $1 + \frac{53 - 78}{78}$   
decay = 0.68

4) New 68, Original 68  $1 + \frac{68 - 68}{68}$   
none = 1

5) If a population of rats was 10 in January and 15 in February, what is the percent growth of these rats?

$$1 + \frac{15 - 10}{10} = 1.5 \%$$

6) If there are 20 foxes in the forest this year, and 21 in one year, what percent is the percent growth of the foxes?

$$1 + \frac{21 - 20}{20} = 1.05 \%$$

7) Last year there were 10 raspberry plants and the population is now 19 plants, what is the annual percent growth?

$$1 + \frac{19 - 10}{10} = 1.9 \%$$

The general formula for exponential growth of a population

$p = \text{pop} = \text{start}$   
 $R = \text{percent rate}$

$$\text{Population} = p(1 + R)^t$$

For the following, determine the Formula then answer the question(s).

8) If the starting population of 5 rabbits grows at 200% each year, how many will there be 20 years?

$$5(1 + 2.00)^{20} = 1.74^{10}$$

$$5(3)^{20} = 15 = 1.74^{10}$$

9) If the starting population of 15 students in school grows at 3% each year, how many will there be 20 years?

$$15(1 + 0.03)^{20} = 27.09$$

$$15(1.03)^{20} = 27.09$$

10) A population of 100 frogs increases at an annual rate of 22%. How many frogs will there be in 5 years?

$$100(1 + .22)^5 = 276.27$$

11) Using this same model for the exponential growth of the frogs, what will be the frog population in

a) 10 years

b) 50 years

$$100(1.22)^{10} = 730.46$$

$$100(1.22)^{50} = 2079656.145$$

12) The population of Henderson City was 3,381,000 in 2015, and is growing at an annual rate of 1.8%. If this growth continues, what will the approximate population of Henderson City be in the year 2020.

**Create a Species and Determine its rate of Growth!**

**Task #1)** What is the name of your species/animal? \_\_\_\_\_

**Task #2)** At this point in time (today), what is the total population of your species? \_\_\_\_\_

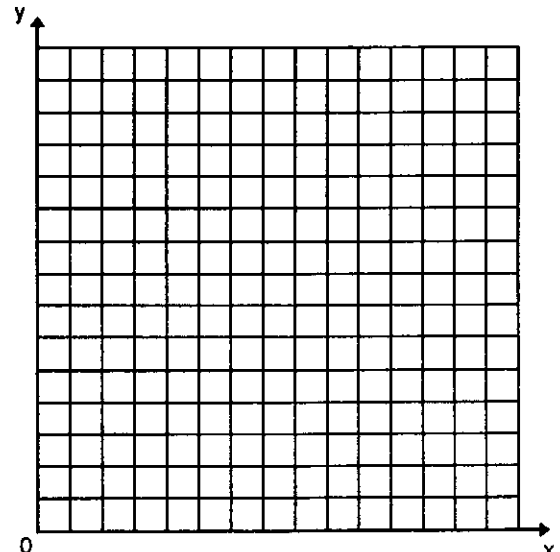
**Task #3)** Pick a number between 5 and 80 to be the percent of growth P percent growth = \_\_\_\_\_% every month

**Task #4)** Write an equation that models the exponential growth of this species Population = \_\_\_\_\_

**Task #5)** Determine what will be the population of your species in 1 month: \_\_\_\_\_ 2 months: \_\_\_\_\_

6 months: \_\_\_\_\_ 1 year: \_\_\_\_\_

**Task #6)** Graph this exponential growth equation



$$1 + \frac{\text{New} - \text{Original}}{\text{Original}}$$