

AP BIO EQUATIONS AND FORMULAS REVIEW SHEET #4

Formulas:

<u>Rate</u>	<u>Population Growth</u>	<u>Exponential Growth</u>	<u>Logistic Growth</u>
dY/dt	$dN/dt = B - D$	$\frac{dN}{dt} = r_{max} N$	$\frac{dN}{dt} = r_{max} N \left(\frac{K - N}{K} \right)$

dY = amount of change B = birth rate D = death rate N = population size

K = carrying capacity r_{max} = maximum per capita growth rate of population

Notes

$$\frac{dN}{dt} = \frac{\Delta N}{\Delta t} = \frac{\text{change in population size}}{\text{change in time}} = \text{population growth rate}$$

Example 1:

There are 300 falcons living in a certain forest at the beginning of 2013. Suppose that every year there are 60 falcons born and 30 falcons that die.

a. What is the **population growth rate** (include units)? Interpret the value.

~~300~~ $60 - 30 = 30$ falcons/year increase

b. What is the **per capita growth rate** of the falcons over a year? Interpret the value.

$$r = \frac{60 - 30}{300} = \frac{30}{300} = 0.1$$

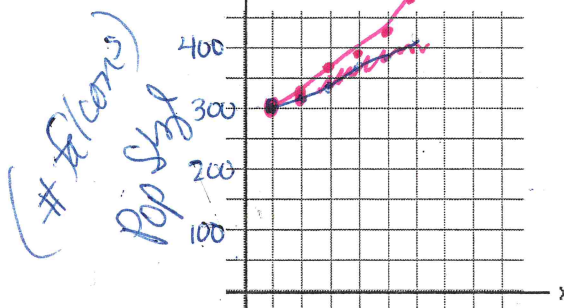
(Total = 320)

The falcon pop will increase by 6.7% each year.

c. Fill in the table and the construct a graph.

Year	Population
2013	300
2014	320
2015	341
2016	364
2017	388
2018	414

x.1
~~320~~ 330
~~341~~ 363
~~364~~ 399
~~388~~ 439
~~414~~ 483



d. Find the **average rate of change** for the falcon population from 2013 to 2018 (include units). Interpret the value.

2013: 300
 2018: 414

$$\frac{414 - 300}{2018 - 2013} = \frac{114}{5} = 22.8 \text{ falcons/year}$$

36.6 fal/year