Calculating Exponential Growth

Formula for Exponential Growth

A quantity A that has exponential growth can be modeled by

$$A = P(1 + r)^n.$$

- A measures the quantity at any time.
- P is the initial value of A, when $n = 0$.
- r is the rate (%) of growth, *in decimal form*.
- n is the elapsed time.

Power [^] or [y^x]

http://www.math.andyou.com/pdf/152.pdf

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EXAMPLE: The growth rate of a bacteria culture is 52% each hour. Initially, there are two bacteria. How many bacteria are there after 12 hours?

$A = P(1+r)^n$

A = ?
P = 2
r = 0.52
n = 12

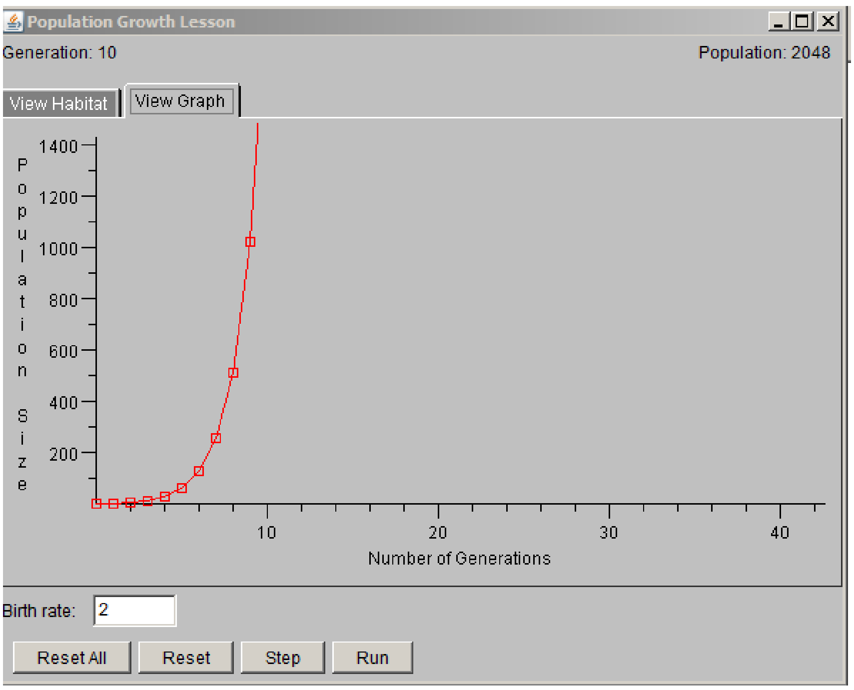
= 2(1+0.52)^12
304.1956862
= 304 bacteria

Under ideal conditions:

NOTES - Exponential Growth.pdf

1. the **biotic potential** of a population is the maximum rate at which it can increase
2. **exponential growth** occurs - the population increases by the same percent from one time period to the next.

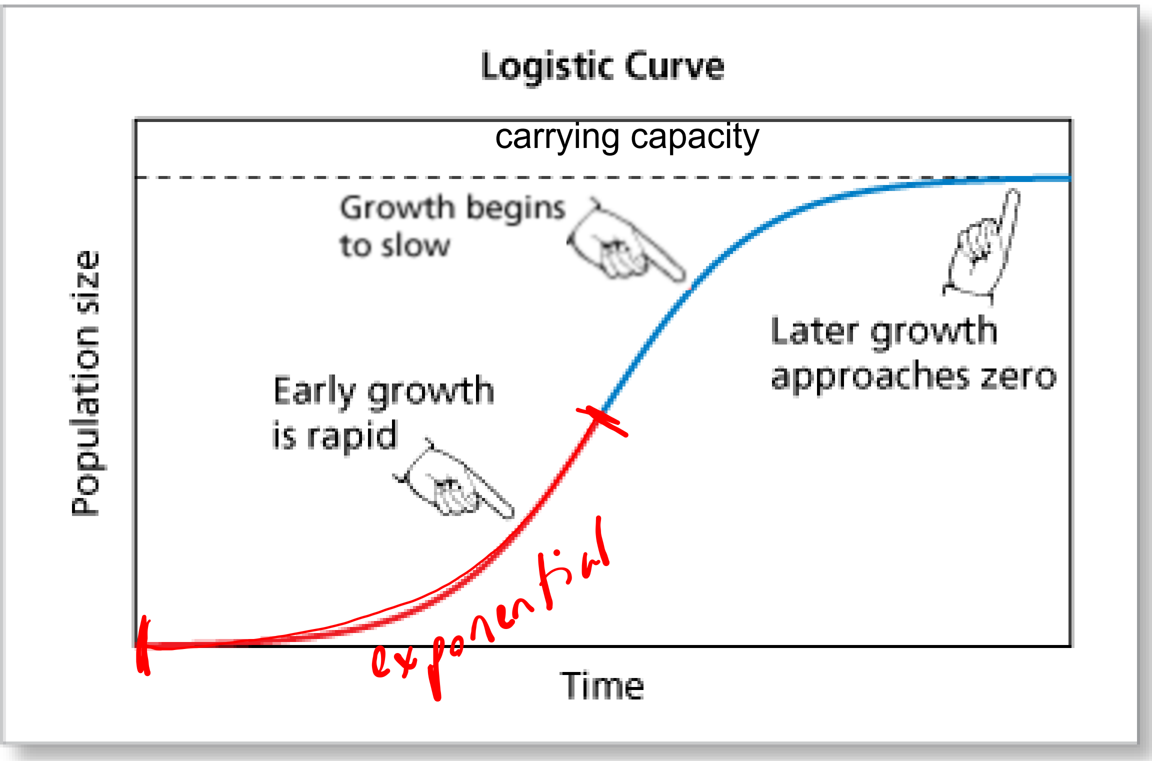
http://www.otherwise.com/population/exponent.html



- In nature, there are always limits to growth. A population will reach a size limit imposed by a shortage of one or more of the **limiting factors** of light, water, space and nutrients.
- **Carrying capacity** represents the highest population that can be maintained for an indefinite period of time by a particular environment.
- When a population grows exponentially at first, and then levels off to a stable number near the carrying capacity, it is called **logistic growth**. Logistic growth is much more common in nature than long-term exponential growth.
- **Natural Capital** - refers to all the natural resources on which people depend upon and includes resources we use to produce manufactured goods.

Exponential Growth -> "J"Curve

Logistic Growth -> "S" curve



Doubling Time - Rule of 72

$$\text{doubling time} = \frac{72}{\text{growth rate}}$$

ie/ annual growth rate of 8%

doubling time = 72/8
= 9 years

Attachments

NOTES - Exponential Growth.pdf