

Population Growth...

- A population is a group of [organisms](#) of one [species](#) that interbreed and live in the same place at the same time (e.g. deer population).
- **Organism** → a living thing
- **Species** → level of classification
- The term "**population growth**" refers to how the number of individuals in a population increases (or decreases) with time.
- If a population has a constant birth rate through time and is never limited by food or disease, it has what is known as **exponential growth**.

EXAMPLE of Exponential Growth



Fluctuations of Human Populations...

- LOCALLY
- REGIONALLY
- GLOBALLY

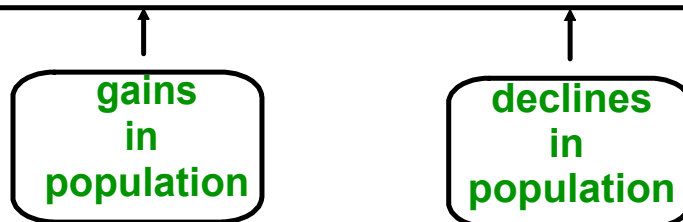
Changing Population Sizes

Four variables affect changes in population sizes...

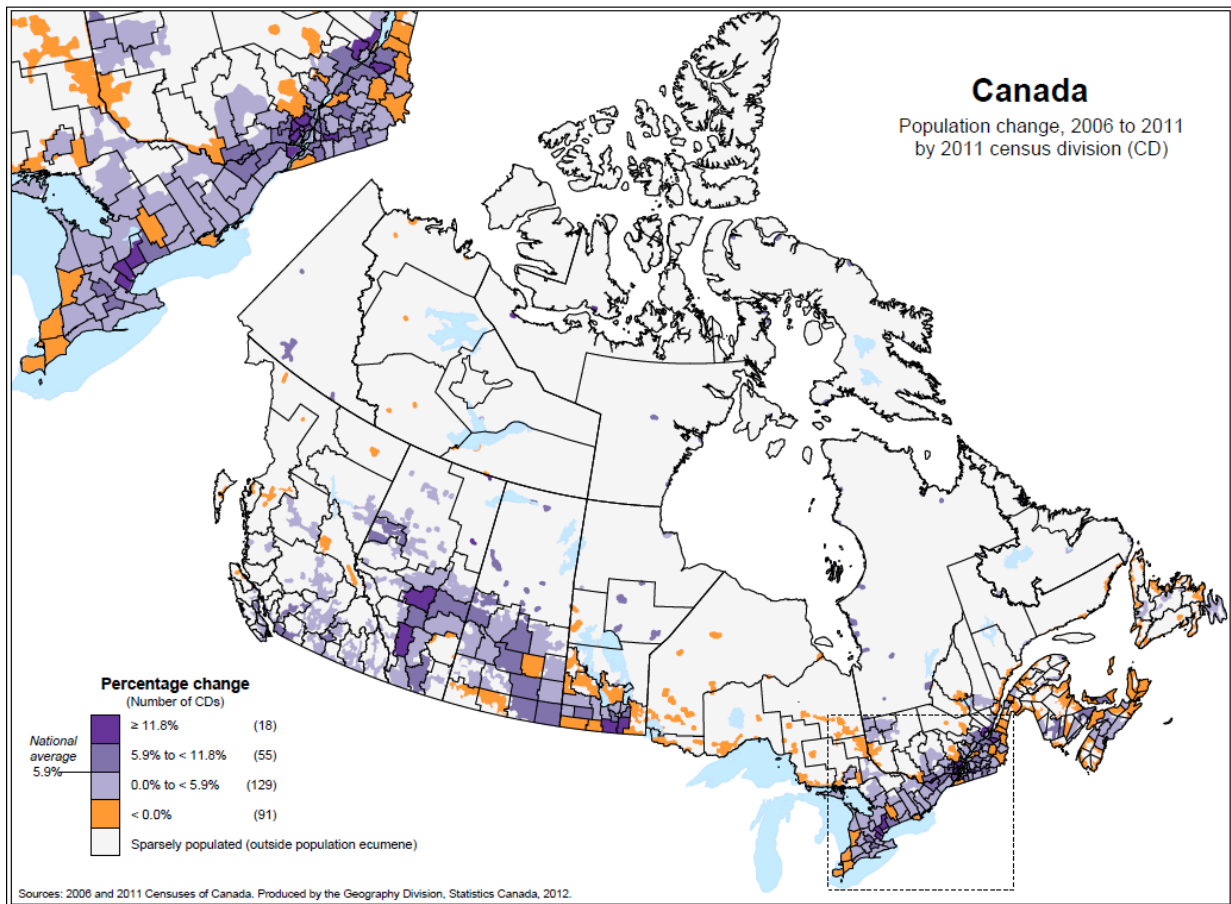
1. births
2. deaths
3. **immigration** - act of entering a nation
4. **emigration** - act of leaving a nation

[A person emigrates **from** Germany and then
immigrates **to** Canada.]

$$\text{population change rate} = (\text{births} + \text{immigration}) - (\text{deaths and emigration})$$



The term "**population growth**" refers to how the number of individuals in a population increases (or decreases) with time.



Let's look at some STATS from...

Statistics Canada Canada

Information for... Browse by subject Browse by key resource Help

Home > Census > Data products > Highlight tables > Population and dwelling counts

Population and dwelling counts, for Canada, provinces and territories, and designated places, 2011 and 2006 censuses

About Data table Download Related data

Select a province or territory

New Brunswick

Population and demography

Births and deaths

Live births, stillbirths, fertility rates, pregnancies, abortions, deaths, causes of death, deaths in hospitals, mortality rates, and life expectancies.

The Canadian Population in 2011: Age and Sex

[Full article in PDF](#) [Share this page](#)

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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.

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

<http://www.math.andyou.com/152>

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?

decimal

A = ?

P = 2

r = 0.52

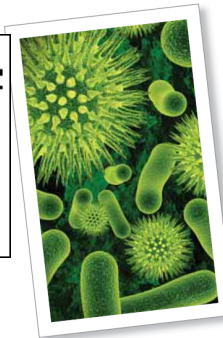
n = 12

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

$$= 2(1 + 0.52)^{12}$$

$$= 304.1956862$$

= 304 bacteria



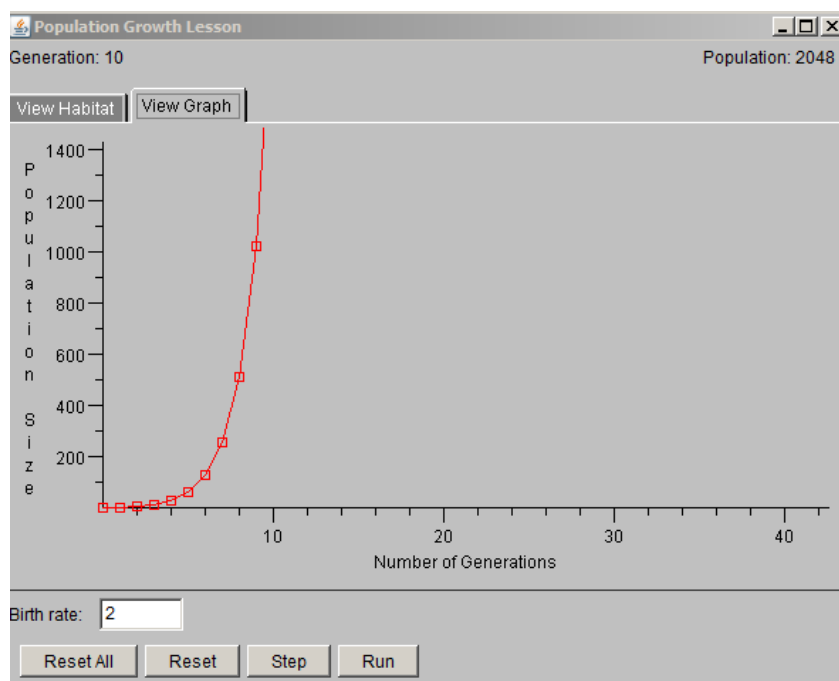
SOLUTION

Under ideal conditions:

NOTES - Exponential Growth.pdf

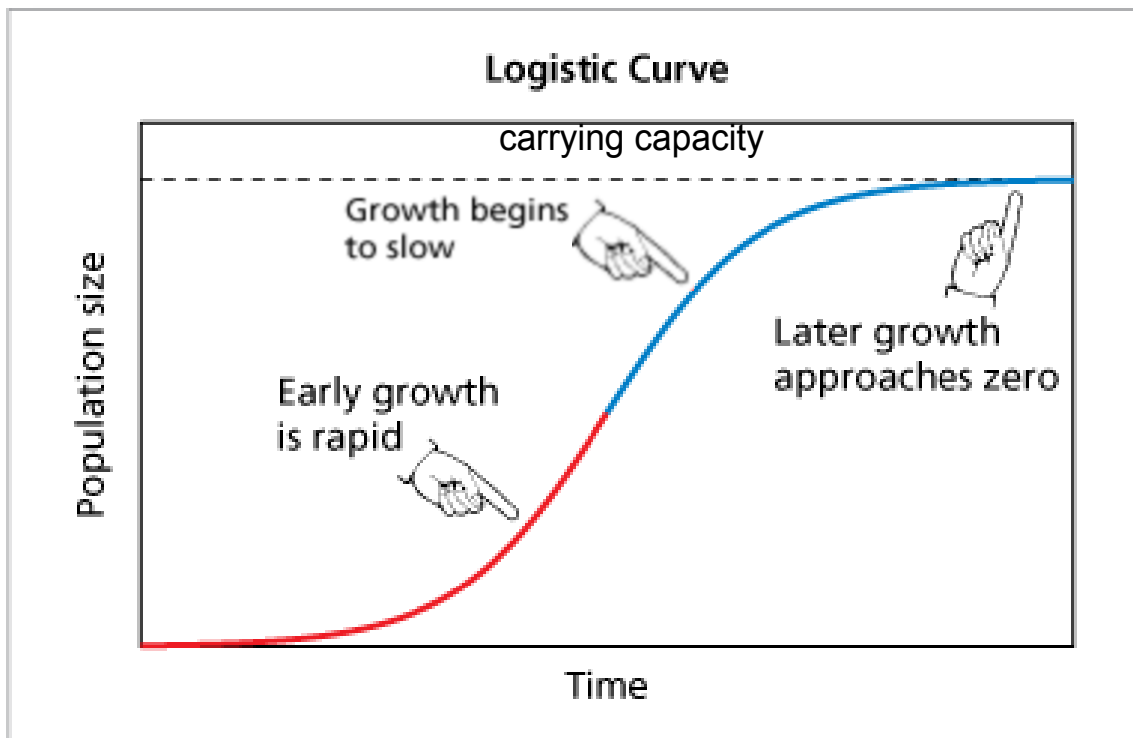
1. the **biotic potential** of a population is the maximum rate at which it can increase
2. **exponential growth** occurs - the population increases by the same percent from one time period to the next.

<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



Attachments

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