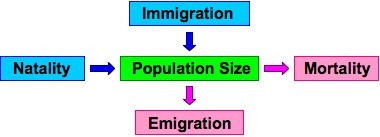
**POPULATIONS**

<http://www.ib.bioninja.com.au/standard-level/topic-5-ecology-and-evoluti/53-populations.html#previous-photo>

**5.3.1 Outline how population size is affected by natality, immigration, mortality and emigration**

The change in population size over a given period of time can be summarised by the following equation:   **Population Size  =  ( N + I )  -  ( M + E )**



**Natality:**  Increases to population size through reproduction (i.e. births)

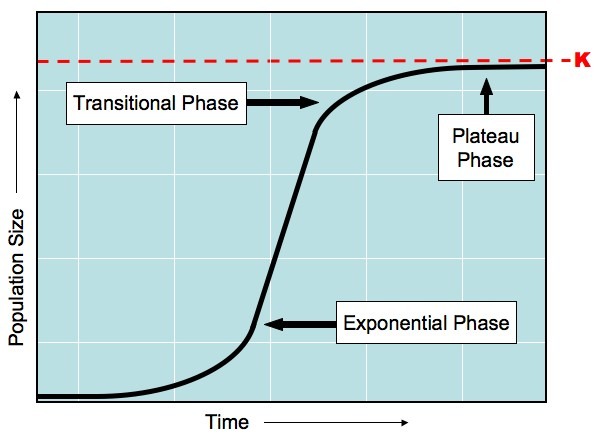
**Immigration:**  Increases to population size from external populations

**Mortality:**  Decreases to population size as a result of death (e.g. predation, senescence)

**Emigration:**  Decreases to population size as a result of loss to external populations

***5.3.2  Draw and label a graph showing the sigmoid (S-shaped) population growth curve***

**Population Growth Curve**



***5.3.3  Explain reasons for the exponential growth phase, the plateau phase and the transitional phase***

Initially, population growth may be slow, as there is a shortage of reproducing individuals which may be widely dispersed

As numbers increase and reproduction gets underway, three stages of population growth are seen:

**Exponential Growth Phase**

* There is a rapid increase in population size / growth as the natality rate exceeds the mortality rate
* This is because there is abundant resources (e.g. food, shelter and water) and limited environmental resistance (disease and predation uncommon)

**Transitional Phase**

* As the population continues to grow, eventually competition increases as availability of resources are reduced
* Natality starts to fall and mortality starts to rise, leading to a slower rate of population increase

**Plateau Phase**

* Eventually the increasing mortality rate equals the natality rate and population size becomes constant
* The population has reached the carrying capacity (K) of the environment
* Limited resources, predation and disease all contribute to keeping the population size balanced
* While the population size at this point may not be static, it will oscillate around the carrying capacity to remain relatively even (no net growth)

***5.3.4  List three factors that sets limits to population increase***

* Every species has limits to the environmental conditions it can endure and must  remain within appropriate levels for population growth to occur
* Some of these factors are density-dependent, while others are unrelated to the density of the population

Factors affecting population growth:

