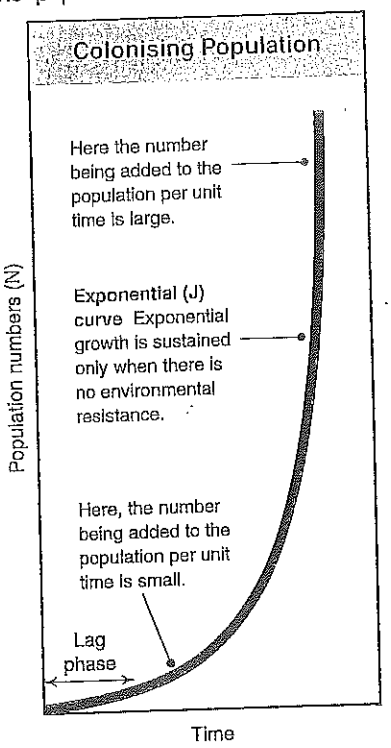
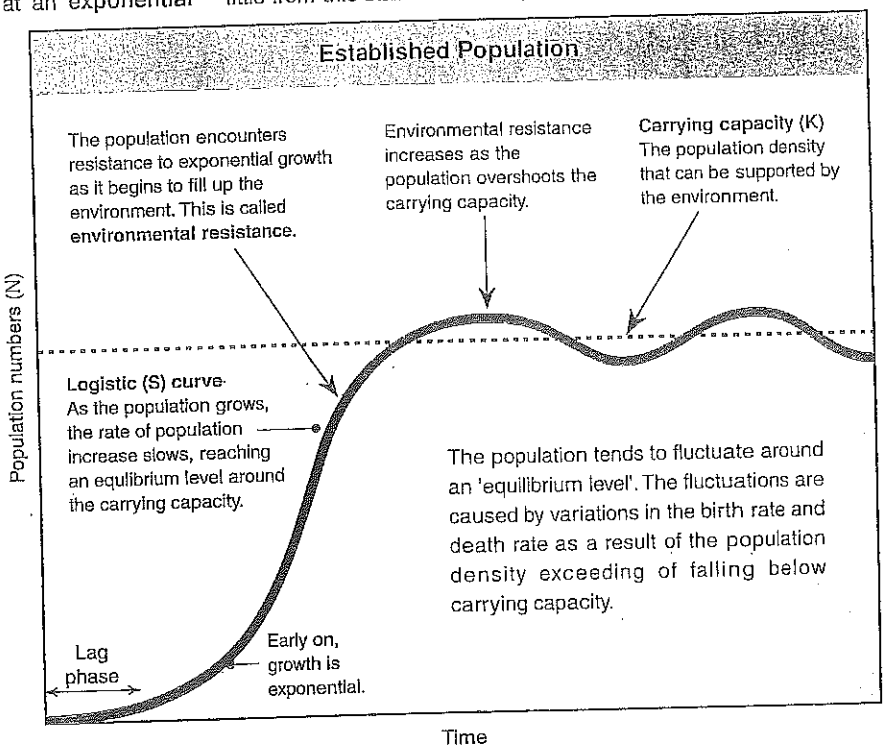
Population Growth Curves

Populations becoming established in a new area for the first time are often termed **colonising populations** (below, left). They may undergo a rapid **exponential** (logarithmic) increase in numbers as there are plenty of resources to allow a high birth rate, while the death rate is often low. Exponential growth produces a J-shaped growth curve that rises steeply as more and more individuals contribute to the population increase. If the resources of the new habitat were endless (inexhaustible) then the population would continue to increase at an **exponential** rate. However, this rarely happens in natural populations. Initially, growth may be exponential (or nearly so), but as the population grows, its increase will slow and it will stabilise at a level that can be supported by the environment (called the carrying capacity or K). This type of growth is called sigmoidal and produces the **logistic growth curve** (below, right). **Established populations** will fluctuate about K, often in a regular way (grey area on the graph below, right). Some species will have populations that vary little from this stable condition, while others may oscillate wildly.





Name: _____

1. What is a colonizing population? _____

2. What type of growth occurs in a colonizing population? _____

3. What shape of growth curve occurs with a colonizing population? _____

4. Why does exponential growth not usually go on indefinitely? _____

5. What shape of growth curve occurs in an established population? _____

6. What is meant by environmental resistance? _____

7. What causes the fluctuation at the "equilibrium level" of an established population? _____

8. What is a carrying capacity? _____

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9. Why does the growth curve of an established population flatten out after early exponential growth?

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10. Species that expand into a new area, such as the rabbits did in areas of Australia, typically show a period of rapid population growth followed by a slowing of population growth as density dependent factors become more important and the population settles around a level that can be supported by the carrying capacity of the environment. (thinking)
    a. Explain why a newly introduced consumer (rabbit) would initially exhibit a period of exponential population growth.

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    b. Describe a likely outcome for a rabbit population after the initial rapid increase had slowed.

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