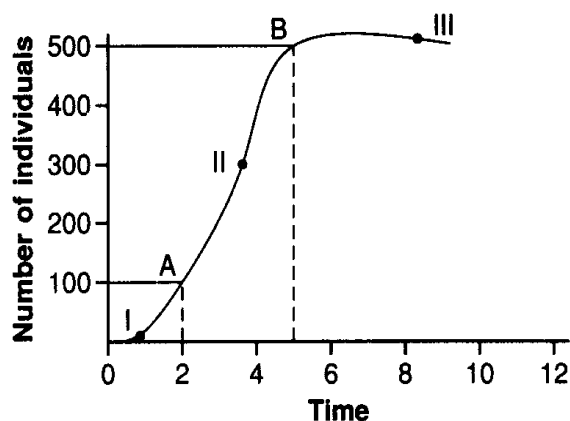


Predator-Prey Relationships

Name: _____

Ecologists gather data about population densities of different organisms in order to understand how these organisms interact with their environments. The graph in Figure 1 represents a growth curve for the population of a single species. This type of curve is called a **logistic growth curve**. From this curve, you can read the carrying capacity of the population. **Carrying capacity** is the number of individuals that can be supported in an environment with the resources available. When the population has reached carrying capacity, the curve will level off.

Figure 1

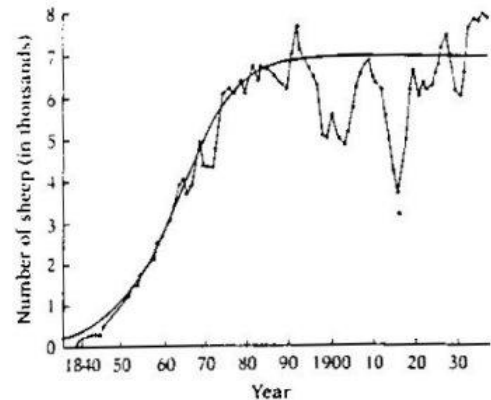


1. Time is represented on the _____-axis.
2. The number of individuals is represented on the _____-axis.
3. At which point on the curve (I, II, III) is the population increasing at the fastest rate? _____
4. At which point on the curve (I, II, III) is the population leveling off? _____
5. At which point on the curve (A or B) has the population reached the carrying capacity or the maximum population density for its environment? _____
6. What would happen to the **growth curve** if the temperature suddenly dropped, a pollutant or a new predator were introduced, thus making the environment less than ideal for this organism?

Examine the following graphs of populations that have reached their carrying capacity. Remember that the carrying capacity (K) of any population can be found on the graph of population growth. Carrying capacity has been reached when the logistic population curve levels off.

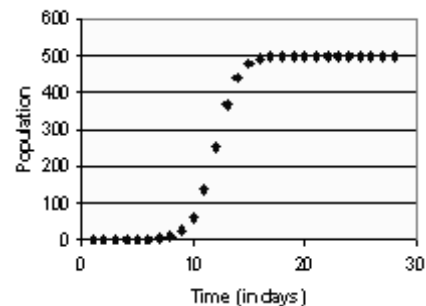
7. Populations tend to fluctuate over time.

This population growth curve for sheep has been normalized, which means that a smooth curve has been drawn to show approximate carrying capacity. What is the carrying capacity of the sheep in this environment?

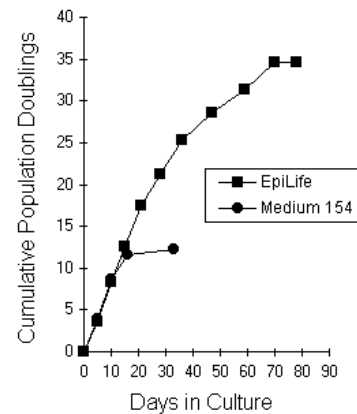


8. A population of daphnia in a pond has the been shown to have a growth curve like the one to the right. How long does it take this population to reach carrying capacity?

What is the carrying capacity of this population?

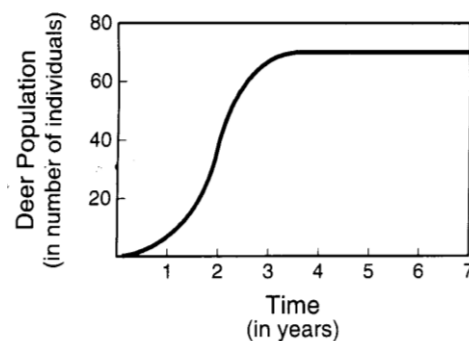


9. The graph to the right shows the population growth curve for a population of bacteria in two different media. Since this is their environment, what is the difference between the carrying capacity of this population in Medium 154 and the EpiLife medium?

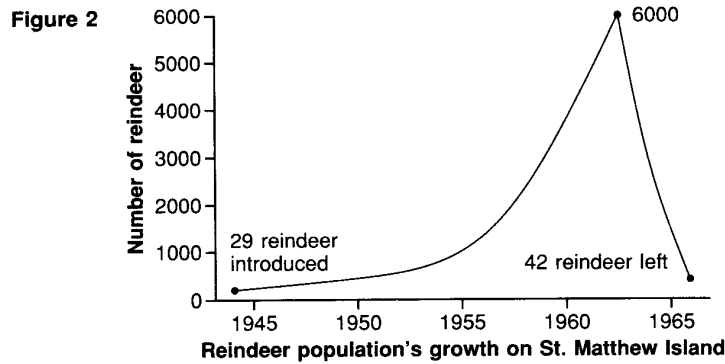


10. It takes large mammals a greater amount of time to reach carrying capacity than it does for a population of small animals or bacteria. What is the carrying capacity of this deer population in its present environment?

How can a population of deer be kept at or near in their environment? (Hint: Think of something that will limit the growth of the deer population.)



In the tundra, where both reindeer and wolves live, the number of reindeer in a herd does not exceed the carrying capacity of the environment. In 1944, the United States Coast Guard transported 29 reindeer to St. Matthew Island in the Bering Strait. St. Matthew Island has the typical climate for a tundra, but no wolves live there. The graph shown in Figure 2 represents the growth curve for the reindeer population there.



11. What is the increase in the reindeer population increase between 1945 and 1963? _____

12. What is the decrease in the reindeer population decrease between 1963 and 1966? _____

13. Did the reindeer exceed the carrying capacity of their environment? _____

Explain your answer. _____

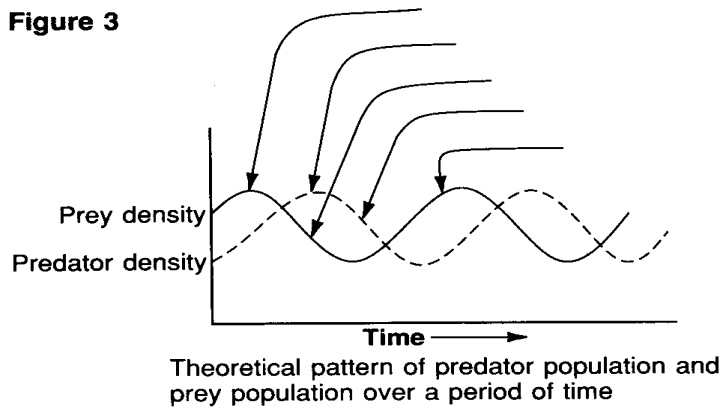
14. Why do you think the population increased so rapidly in less than 20 years? _____

15. Why do you think that the population declined so rapidly, from 6000 to 42, in 3 years? _____

16. What do you think would have happened if wolves had been brought to the island with the reindeer? _____

Predation is not necessarily harmful to the prey population. Predation might act as an important means of keeping the prey population within the limits of its food supply. The graph shown in Figure 3 represents a theoretical cycle that evolves in a predator-prey relationship.

Figure 3



17. Read the following lettered descriptions. Use the letters to **label the graph** in order to show what is happening to the populations of predators and prey at each point marked on the curve.

- Prey population rises due to decline in predator population.
- Predator population rises due to increase in prey population.
- Prey population falls due to increase in predation.
- Predator population falls due to decline in prey population.
- Prey population rises.

18. Could these theoretical growth curves for predators and prey actually represent what happens in nature? _____

Explain your answer. _____
