Name_____ Class_____ Date_____

5.1 How Populations Grow & 5.2 Limits to Growth

Describing Populations Researchers study five important characteristics of a population:

- Geographic range is the area in which a population lives.
- **Population density** is the number of individuals per unit area.
- Population distribution is how individuals are spaced out in their range.
- Growth rate determines whether a population grows, shrinks, or stays the same size.
- **Age structure** is the number of males and females of each age in a population.

Population Growth Populations can grow, shrink, or stay the same size.

- Factors that increase population size include births and **immigration**, which is the movement of individuals into an area.
- Factors that decrease population size include deaths and **emigration**, which is the movement of individuals out of an area.

Exponential Growth When conditions are ideal, the larger a population gets, the faster it grows. When a population's numbers grow larger with each generation, **exponential growth** is occurring. Ideal conditions include unlimited resources and absence of predation and disease.

Logistic Growth Resources become less available as a population grows.

- **Logistic growth** occurs when population growth slows and then stops after a period of exponential growth has occurred.
- Population size stabilizes at the **carrying capacity**, the maximum number of individuals of a given species that an environment can support.

Limiting Factors A **limiting factor** is a factor that controls the growth of a population.

- Some factors depend on the density of the population. Others do not.
- Acting separately or together, limiting factors determine an environment's carrying capacity.
- Limiting factors produce the pressures of natural selection.

Density-Dependent Limiting Factors

- **Density-dependent limiting factors** operate strongly when the number of individuals per unit area reaches a certain point.
- Examples include:
  - competition
  - predation and herbivory
  - parasitism and disease
  - stress from overcrowding

Density-Independent Limiting Factors Some limiting factors do not necessarily depend on population size.

- **Density-independent limiting factors** depend on population density, or the number of organisms per unit area.
- Examples include severe weather, natural disasters, and human activities.
- Some of these factors may have more severe effects when population density is high.

Describing Populations

For Questions 1–5 complete each statement by writing the correct word or words.

1. The _____ is the area in which a population lives.

2. Population density is the _____ of individuals per unit area.

3. How the individuals are spaced in their range is a population's_____

4. Growth rate is how quickly a population _____ in size.

5. To find the _____ of a population, count the number of males and females of each age.

Population Growth

For Questions 6–10, write True if the statement is true. If the statement is false, change the underlined word or words to make the statement true

_____ **6.** If the death rate is <u>less</u> than the birthrate, the population is likely to shrink.

_____ **7.** <u>Immigration</u> increases population size.

_____ **8.** Young animals may <u>immigrate</u> from the place where they were born to establish new territories.

_____ **9.** A high birthrate and immigration <u>decrease</u> population size.

_____ **10.** Populations grow if <u>more</u> individuals are born than die in a period of time.

Exponential Growth

12. Describe the conditions in which exponential growth occurs.

_____

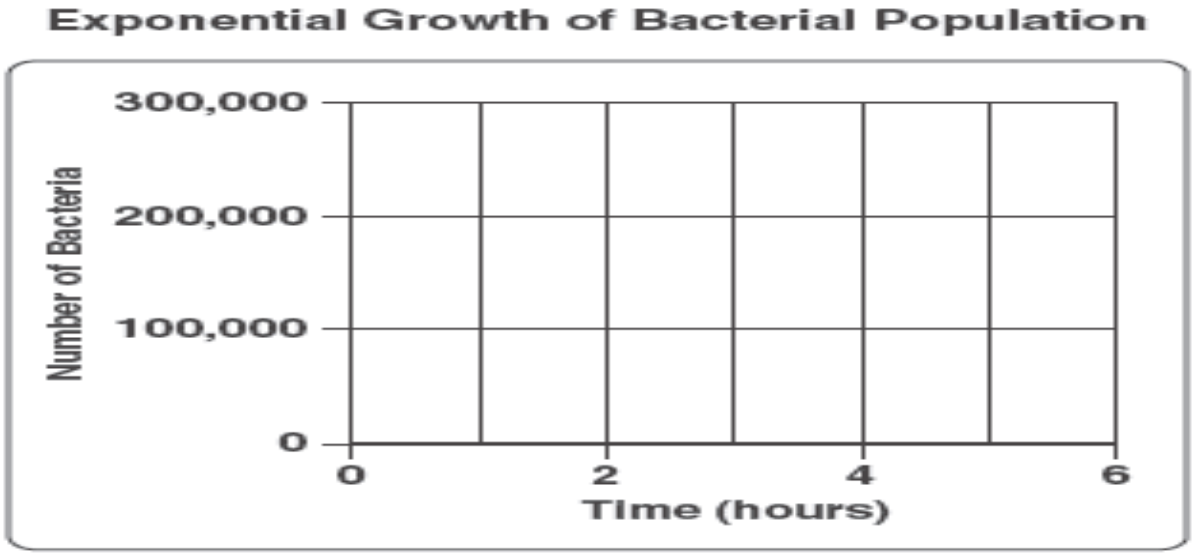
_____

13. Can exponential growth occur in a population of organisms that take a long time to reproduce? Why or why not?

_____

_____

14. Complete the graph by drawing the characteristic shape of exponential population growth.

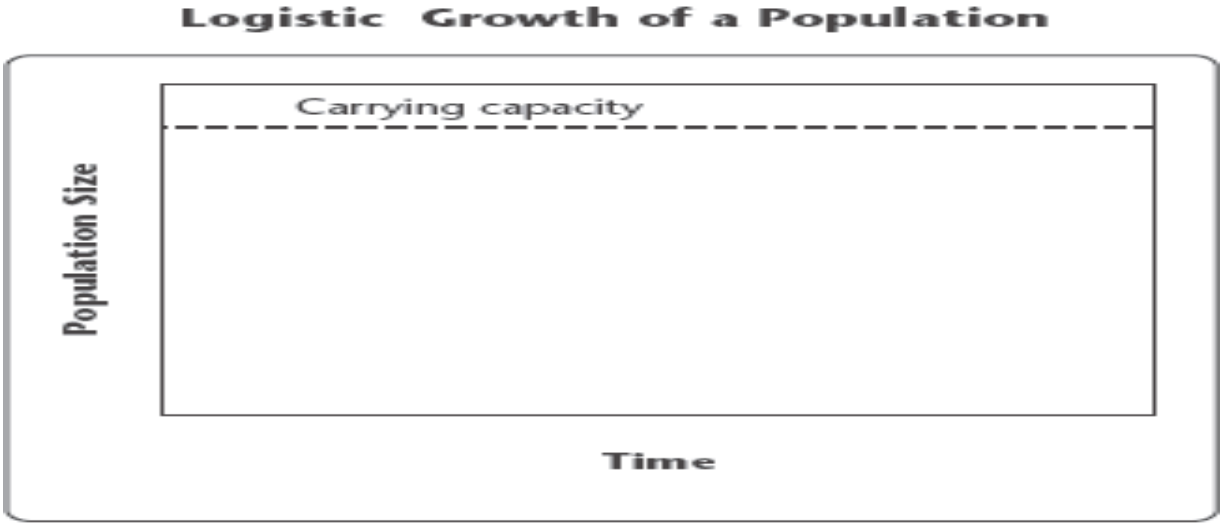


15. What letter is used to refer to the characteristic shape of an exponential growth curve?

_____

Logistic Growth

16. Complete the graph by drawing the characteristic shape of logistic population growth.



17. What letter is used to refer to the characteristic shape of the logistic growth curve?

_____

18. When real-world populations of plants and animals are analyzed, why do they most often have the logistic growth curve?

_____

_____

19. What does the term carrying capacity refer to?

_____

_____

20. Complete the table to name and explain three phases of logistic growth. Use the terms *growth rate, population size*, and *carrying capacity* in your explanations.

Phases of Logistic Growth		
Phase	**Phase name**	**Explanation**
1		
2		
3		

Density-Dependent Limiting Factors

7. What is a density-dependent limiting factor?

_____

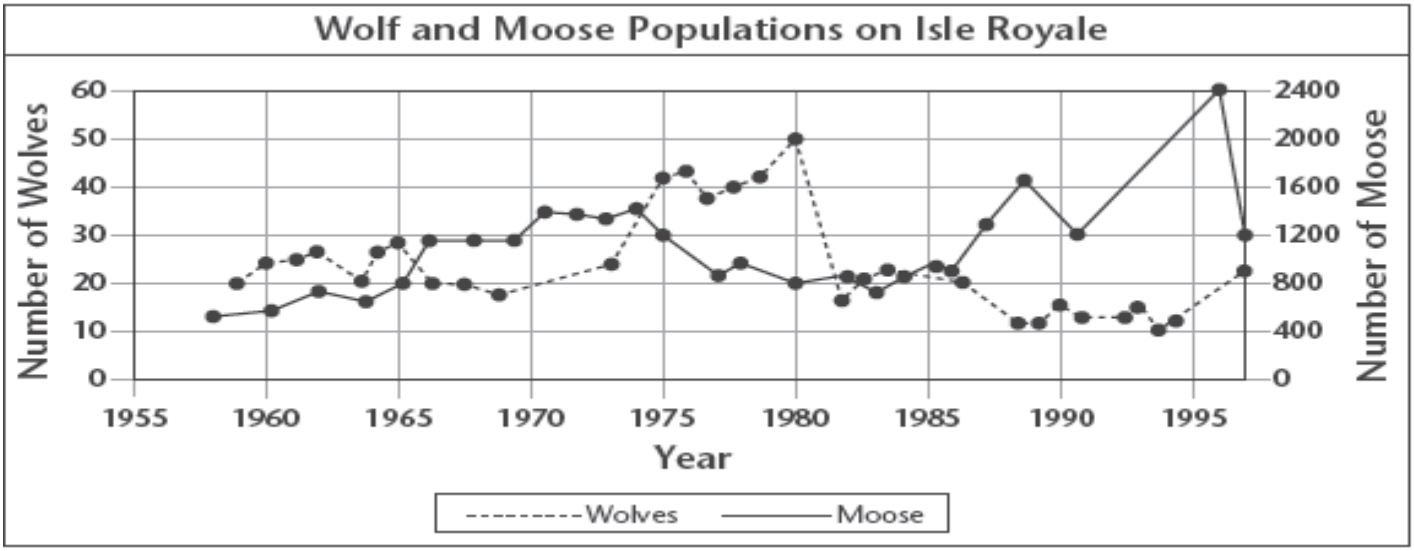
8. When do density-dependent factors operate most strongly?

_____

9. What are four density-dependent limiting factors?

_____

_____



10. What happened to the number of wolves on Isle Royale between 1975 and 1985?

_____

11. What happened to the moose population when the number of wolves was low?

_____

12. What is the relationship between the moose and the wolves on Isle Royale?

_____

13. Is the number of moose on the island a density-dependent or density-independent limiting factor for the wolf?

_____

_____

Density-Independent Limiting Factors

14. What term describes a limiting factor that affects all populations in similar ways, regardless of population size?

_____

15. What is the usual response in the population size of many species to a density-independent limiting factor?

_____

16. Complete the graphic organizer with examples of density-independent limiting factors.