

5.1 How Populations Grow

Describing Populations

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

1. The **geographic range** is the area in which a population lives.
2. Population density is the **number** of individuals per unit area.
3. How the individuals are spaced in their range is a population's **distribution**.
4. Growth rate is how quickly a population **changes (increase or decrease)** in size.
5. To find **the age structure** of a population, count the number of males and females of each age.

Population Growth

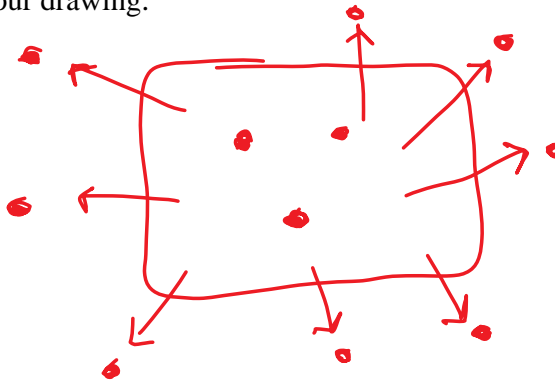
For Questions 6–10, write *True* if the statement is true. If the statement is false, change the underlined word or words to make the statement true

- greater** 6. If the death rate is less than the birthrate, the population is likely to shrink.
- true** 7. Immigration increases population size.
- emigrate** 8. Young animals may immigrate from the place where they were born to establish new territories.
- Increase** 9. A high birthrate and immigration decrease population size.
- True** 10. Populations grow if more individuals are born than die in a period of time.

11. **THINK VISUALLY** The dots in the box represent individuals in a population with a random pattern of distribution. Use arrows and dots to show what will happen to this population if emigration is greater than immigration. (Assume birthrate and death rate are equal.) in the space below, explain your drawing.



* more leaving
than staying



Exponential Growth

12. Describe the conditions in which exponential growth occurs.

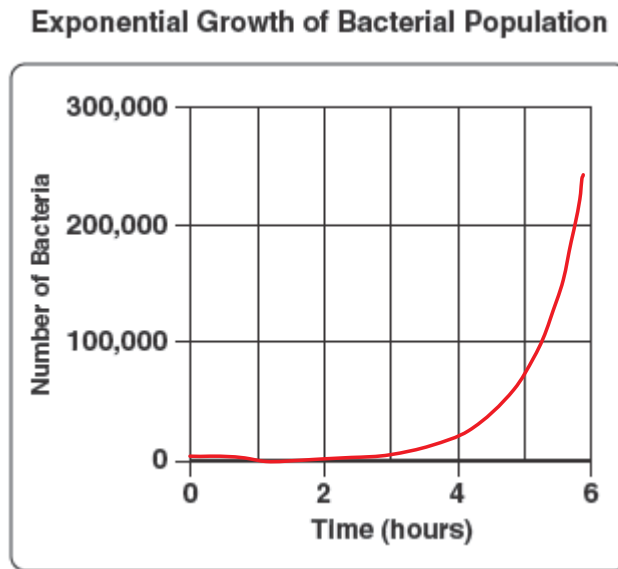
IDEAL CONDITIONS:

- **Unlimited: food, water, space air , sunlight availability to reproduction**
- **No: disease, predators, natural disasters**

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

YES. As long as birthrate increases each year.

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? **J**

Logistic Growth

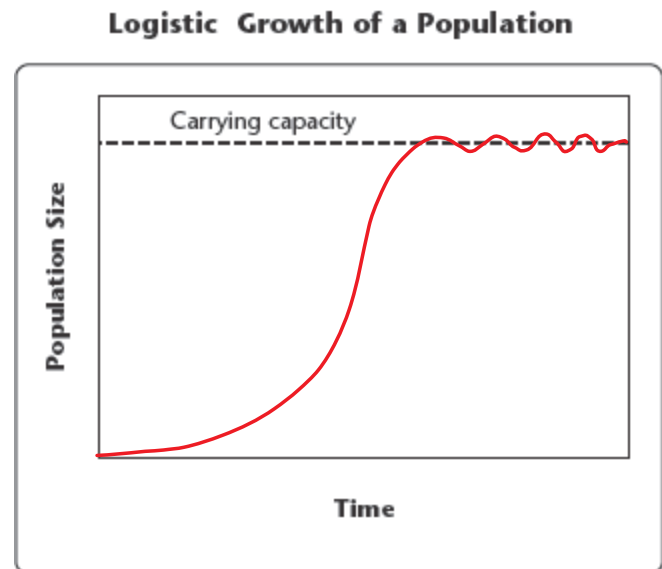
16. Complete the graph by drawing the characteristic shape of logistic population growth.

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

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

They do not have ideal conditions.

Therefore competition & all other limiting factors play a role



19. What does the term carrying capacity refer to?

Maximum number of individuals of a given species that can be supported by a given environment.

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	EXPONENTIAL	HIGH GROWTH RATE, POPULATION GROWS RAPIDLY
2	GROWTH SLOWS	GROWTH RATE SLOWS AND POPULATION GROWS SLOWLY
3	CARRYING CAPACITY	GROWTH RATE = 0

5.2 Limits to Growth

Limiting Factors

For Questions 1–6, write *True* if the statement is true. If the statement is false, change the underlined word to make the statement true

Carrying 1. Limiting factors determine the immigration capacity of a population.

True 2. A limiting factor controls the growth of a population.

Logistic 3. Limiting factors operate when growth is exponential.

True 4. Populations grow too large in the absence of limiting factors.

True 5. Competition is an example of a limiting factor.

True 6. Population size can be limited by factors such as predation.

Density-Dependent Limiting Factors

7. What is a density-dependent limiting factor?

A factor that depends on the number of organisms per unit area

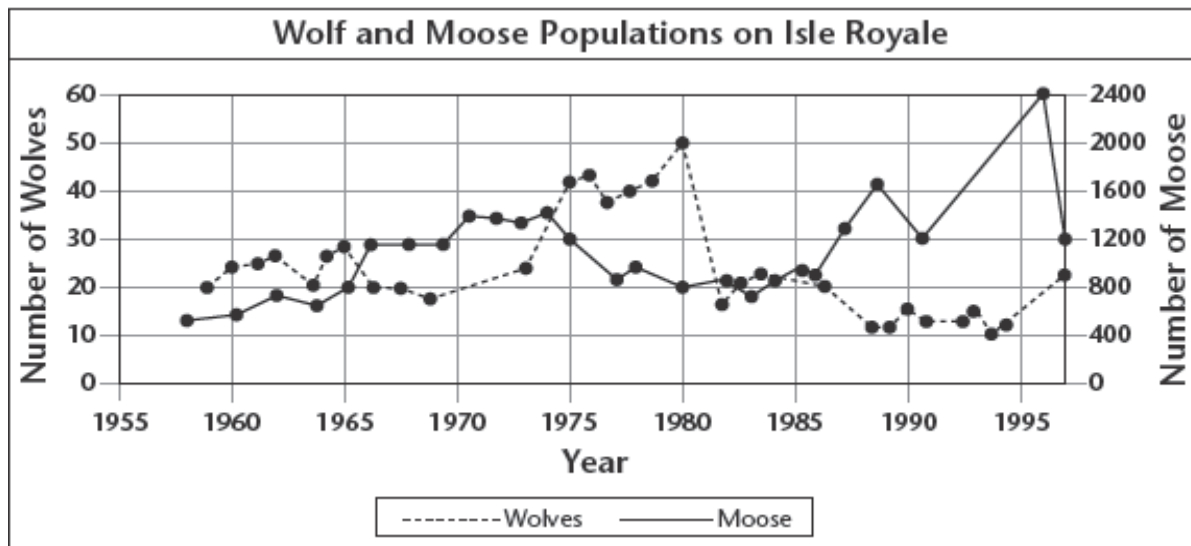
8. When do density-dependent factors operate most strongly?

Large, dense populations

9. What are four density-dependent limiting factors?

Competition, disease, Predation, Parasitism, Herbivory, Stress from overcrowding

Use the graph to answer Questions 10–13.



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

DECLINE (by Half)

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

INCREASE RAPIDLY

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

WOLF = PREDATOR MOOSE = PREY

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

Density-Independent Limiting Factors

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

DENSITY-INDEPENDENT LIMITING FACTORS

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

Population decreases

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

