Name _____ **Period** _____

Chapter 36: Population Ecology

Guided Reading Activities

Big idea: **Population structure and dynamics**

Answer the following questions as you read modules 36.1–36.8:

1. Yellowstone National Park is home to many animals. For example, elk and gray wolves are found there. Would the elk and wolves be considered a population? Briefly explain your answer.
   No, they would be considered two separate populations.

2. Which of the following is a population?

   a. Lake Michigan

   b. A human jogging in the street

   c. Squirrels in Central Park

   d. The benthic zone of an ocean

3. A branch of biology that deals with how populations change over time and the factors that regulate them is population ecology.

4. The population structure of a species is largely determined by two factors. Identify and describe those two factors.
   The two factors are population density and dispersion pattern. Population density refers to the number of individuals in a given area. Dispersion pattern refers to how members of the population are spaced within that given area.

5. Complete the following table, which compares the different dispersion patterns.

	Clumped	Uniform	Random
Description	Individuals are grouped into distinct patches.	Individuals are evenly spaced.	Organisms are placed with no discernible pattern.
Example	Sea stars at low tide	Humans at a beach	Dandelions

6. Certain seeds like raspberries and blackberries require digestion within a bird to open the seed to water and air (once it has been defecated by the bird). What kind of dispersion pattern would you expect (for these berries) as a result of this?
   You would expect a clumped distribution because there would be clusters of seeds at the locations of the droppings.

7. The likelihood that an individual of a population will survive to a certain age is known as a(n) ____life table____.

8. According to Table 36.3 on page 725 in your textbook, what is the chance that a human will survive to voting age?

   a. 100%

   b. 99.6%

   c. 99%

   d. 36%

9. Complete the following table, which identifies and describes the different types of survivorship curves.

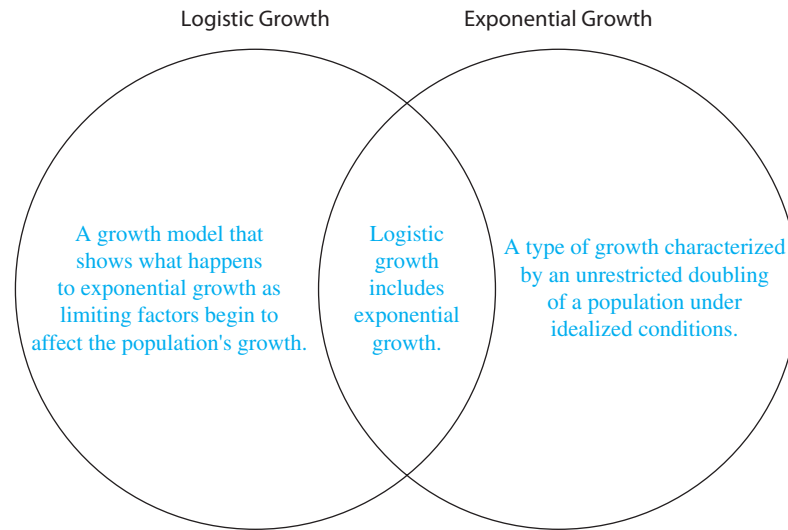|	Type I	Type II	Type III
Description	These organisms usually produce only a few offspring but give them good care. The offspring usually survive to maturity.	This is a curve characterized by survivorship across the entire lifespan.	These organisms produce large amounts of offspring but very few live to maturity. The adults provide very little care for the offspring.

10. True or false: The exponential growth model assumes that immigration is higher than emigration. If false, make it a correct statement.
    False, it assumes that the two rates are equal.

11. Can a population of organisms grow exponentially indefinitely? Briefly explain your answer.
    No, because limiting factors would eventually begin to have a negative impact on population growth. No population of organisms can grow exponentially indefinitely.

12. Complete the Venn diagram that compares logistic growth to exponential growth.
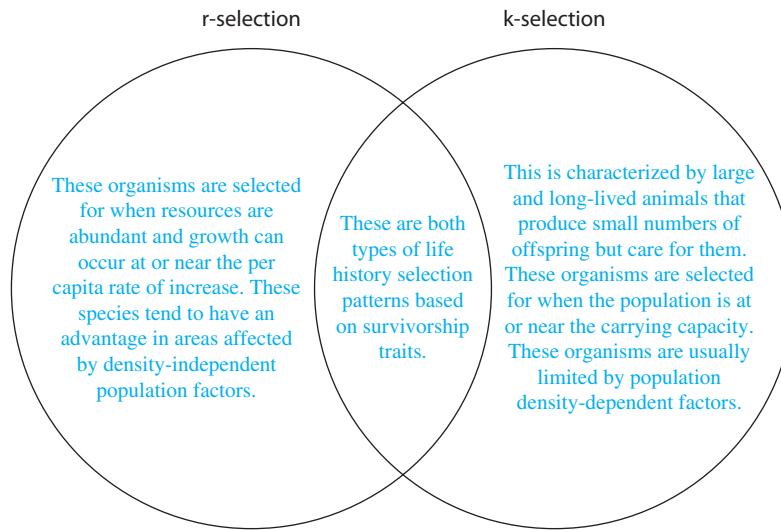
Logistic Growth   Exponential Growth

A growth model that shows what happens to exponential growth as limiting factors begin to affect the population's growth.

Logistic growth includes exponential growth.

A type of growth characterized by an unrestricted doubling of a population under idealized conditions.

13. Complete the following table, which compares density-dependent factors to density-independent factors.

	Density-dependent factors	Density-independent factors
Description	Factors that limit the growth of populations in a way that depends on the density of the population.	Factors that limit the growth of populations in a way that does not depend on the density of the population.
Example	Infectious disease	A natural disaster

14. A hurricane strikes the East Coast with devastating effect. Would this be an example of a density-dependent factor or density-independent factor? Briefly explain your answer.
This would be a density-independent factor because the hurricane affects a population regardless of density.

15. Around 1887, there was a huge increase in snowshoe hares. What happened to the lynx population? Refer to Figure 36.6 on page 729 of your textbook.
The lynx population went up in relation to the hare population.

16. Why does it make sense that predator-prey species relationships follow boom-and-bust cycles?
It makes sense because the predators depend on the prey for food. The more prey in an area, the more predators can be supported. The fewer prey in an area, the fewer predators that can be supported in that area.

17. True or false: The experiments on guppies showed that life traits are shaped by evolution and that they are heritable. If false, make it a correct statement.
True

18. Complete the Venn diagram that compares r-selection with k-selection.

r-selection   k-selection

These organisms are selected for when resources are abundant and growth can occur at or near the per capita rate of increase. These species tend to have an advantage in areas affected by density-independent population factors.

These are both types of life history selection patterns based on survivorship traits.

This is characterized by large and long-lived animals that produce small numbers of offspring but care for them. These organisms are selected for when the population is at or near the carrying capacity. These organisms are usually limited by population density-dependent factors.

19. The harvesting of resources from an area without damaging the area or the resource is known as sustainable resource management.

20. List three factors taken into account when implementing an integrated pest-management system.
Integrated pest management (IPM) takes into account the following factors: knowledge about the population ecology of the pest, knowledge about the predators of the pest, and crop growth dynamics.

Big idea: The human population

Answer the following questions as you read modules 36.9–36.11:

1. During what year did human population growth really begin to take off? Refer to Figure 36.9A on page 732 in your textbook.

   a. 2000

   b. 1950

   c. 1850

   d. 2050

2. Briefly describe what happens in a demographic transition.
   In a demographic transition, a population undergoes a shift where the birth and death rates are high but equal to birth and death rates that are low but equal.

3. Match the following terms with their proper description: age structure, fertility rate, and population momentum.

   Growth in population due to a growth in the number of women at childbearing age: <u>Population momentum</u>

   Average number of children produced over a woman's lifetime: <u>Fertility rate</u>

   Number of individuals in age groups: <u>Age structure</u>

4. How many millions of Americans were in their reproductive prime in 2012? What about in 2035? Refer to Figure 36.10 on page 734 of your textbook.
   Approximately 60 million

5. The amount of land, water, and resources it takes to sustain a population is known as the <u>ecological footprint</u>.

6. Go to the following website: www.myfootprint.org. Use it to determine your eco footprint and record it here.
   Student answers will vary.

CONNECTING THE BIG IDEAS

Use your knowledge of the information contained within this chapter's "Big Ideas" to answer this question.

If a disease wiped out the human population, what three types of species do you think would fill our void? Briefly explain your answer.