

SBI4U Unit 5 Test: Population Dynamics (50 Marks Total)

Name: _____

Signature: _____

Marks obtained:

Category	Total Marks	Possible Marks
Knowledge/Understanding (K/U)		10
Thinking/Investigation (T/I)		15
Application (A)		20
Communication (C)		5
Total		50
Percentage		

SECTION 1: Knowledge/Understanding - Multiple Choice (Questions 1-10)

[K/U, 10: 1 each]

Write your section 1 answers here:

Question	1	2	3	4	5	6	7	8	9	10
Answer										

$$r = r_{max} \frac{(K-N)}{K} \quad r_{max} = \frac{\ln(N/N_0)}{t} \quad \frac{dN}{dt} = r_{max} N \frac{(K-N)}{K}$$

$$N = N_0 e^{r_{max} t} \quad N = \frac{Mn}{m}$$

K/U	T/I	A	C
/10			

****NOTE: FOR SECTIONS 1 WRITE YOUR ANSWERS IN THE TABLES ON THE FIRST PAGE OF THIS TEST****

SECTION 1: Knowledge/Understanding - Multiple Choice (Questions 1-10)

[K/U, 10: 1 each]

1. The role played by a particular population in a community is referred to as its
 - a) habitat
 - b) biome
 - c) ecological niche
 - d) range
 - e) trophic structure

2. In any community, a species that is a herbivore is probably a
 - a) primary producer
 - b) primary consumer
 - c) secondary consumer
 - d) tertiary consumer
 - e) terrestrial organism

3. Logistic population growth
 - a) occurs in unlimited environments produces a J-shaped curve when graphed
 - b) is slow to begin with, but then speeds up and remains high until some abiotic factor
 - c) reduces population size is regulated by density-dependent factors,
 - d) such as competition between individuals for limited resources
 - e) is not affected by the carrying capacity of the environment

4. Human activity
 - a) can decrease the carrying capacity of Earth for humans
 - b) has an effect on the carrying capacity of Earth for non-human organisms
 - c) can increase the carrying capacity of Earth for humans
 - d) both (a) and (b) are true
 - e) (a), (b), and (c) are true

5. Gases produced by the combustion of gasoline and released in the exhaust of vehicles contribute to
 - a) the production of photochemical smog
 - b) depletion of the ozone layer
 - c) the greenhouse effect
 - d) acid precipitation
 - e) (a), (c), and (d)

6. Which of the following summarizes the demographic characteristics of a population?
 - a) survivorship curve
 - b) age-specific survivorship
 - c) age-specific mortality
 - d) life table
 - e) none of the above

7. Overpopulating rabbits in Australia were finally controlled by a disease that spread through their populations. The mortality rate in regions with a large population was higher than the mortality rate in regions with a small population. What does this situation illustrate?
 - a) density-dependent effect
 - b) density-independent effect
 - c) interspecific competition
 - d) intraspecific competition
 - e) none of the above

8. Which statement best describes a type III survivorship curve?
 - a) Most individuals die during their reproductive years.
 - b) Individuals die at a constant rate throughout time.
 - c) Most individuals die of old age.
 - d) Most individuals die early in life.
 - e) None of the above

[T/I, 15; A, 14]

12. A population of 100 animals is experiencing logistic growth. If $r_{\max} = 0.4$ and $K = 102$, calculate the value of r . **Round your final answer to 2 significant digits. Show your work.** [T/I, 3]

13. A hypothetical population has a maximum per capita growth rate of 2.5% per year. Determine the approximate time in years that it will take for the population to double in size. **Round your final answer to 4 significant digits. Show your work.** [T/I, 3]

14. On an isolated island, what are the two determinants of the size of a population? Explain your thinking. [T/I, 4]

15. How might you determine how big a certain population will grow? Design a study that would allow you to decide whether the growth of a given population of mice (isolated in a field surrounded by roads) was logistic or exponential, and to determine how big the population might get. [T/I, 5]

16. Biologists have observed increasing instances of coral bleaching in recent years. This phenomenon involves the death of small green algae that live in the tissues of coral polyps (the

K/U	T/I	A	C
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tiny animals whose bodies secrete much of the material that forms coral reefs). Following the death of the algae, the coral organisms that hosted them also die. Describe the probable type of relationship that exists between the algae and coral organisms. [A, 3]

17. How could foresters or biologists use growth models of insect populations to better manage forests? [A, 3]

18. Do you think the current trend toward globalization of industries and businesses will increase the carrying capacity of the world or decrease it? Might the effect be different in different countries or regions? Explain your answers. [A, 4]

19. What factors might eventually limit the exponential growth rates of a particular insect species found in such regions as the Canadian prairies? [A, 4]

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SECTION 4: Communication – Short Answer (Question 20)

[C, 5]

- 20.** Real estate developers want to build apartments outside of the city near an ancient forest. How would you describe to them about some of the impacts of urban sprawl on the ecosystems surrounding a city? What would you consider to be the most serious of these?

K/U	T/I	A	C
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