

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

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#### 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										

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

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

#### SBI4U Unit 5: Population Dynamics

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/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



- **9.** Which of the following is/are density-dependent growth factor(s)?
  - a) Competition

c) Disease

e) Allee Effect

b) Predation

- d) Overcrowding
- **10.** Approximately how many years does it take for a population with an annual growth rate of 0.3% to double?
  - a) 15 years

c) 160 years

e) None of the above

b) 30 years

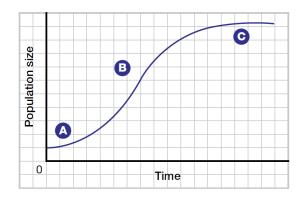
d) 230 years

# **SECTION 2: Application - Labeling (Questions 11)**

[A, 6: 1 each]

**11.** Examine the graph shown here and describe what is happening in the portions of the curve labelled (a), (b), and (c). Explain why growth is slow or fast in each of these regions of the curve.

[A, 6]



# SECTION 3: Thinking/Inquiry & Application – Short Answer (Questions 12-19)

Label (letter)	Explanation
(a)	
(b)	
(c)	

SBI4U Unit 5: Population Dynamics

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2. A population of 100 animals is experiencing logistic growth. If $r_{max} = 0.4$ and $K = 102$ the value of $r$ . Round your final answer to 2 significant digits. Show your work.	[T/I, 3
3. A hypothetical population has a maximum per capita growth rate of 2.5% per year. the approximate time in years that it will take for the population to double in size. Final answer to 4 significant digits. Show your work.	
<b>4.</b> On an isolated island, what are the two determinants of the size of a population? Exthinking.	plain your [T/I, 4]
5. How might you determine how big a certain population will grow? Design a study the allow you to decide whether the growth of a given population of mice (isolated in a surrounded by roads) was logistic or exponential, and to determine how big the population get.	field

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<b>17.</b> How of forest		rs or biologists	use growth m	nodels of insect popu	ulations to better man	age <i>[A, 3]</i>
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TION 4. Commun	sication Chart A.		tion 20\	
TION 4: Commu	<u>nication – Short Ai</u>	nswer (Ques	<u>tion 20)</u>	
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	? What would you con			
surrounding a city	: What Would you con	isider to be the	inost serious or the	:30:

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SBI4U Unit 5:	Population D	ynamics	/4	/5