

Organisms and Populations — Assignment 2

Class 12 Biology · Higher-difficulty challenge set + integrated problems · Answer key included · Narayan Gurukul Academy

Instructions: (1) Attempt all questions; start with the topic-wise challenge set, then attempt the integrated (multi-topic) problems.
(2) Give all answers with correct SI units. $g = 10 \text{ m/s}^2$ unless stated.
(3) A final answer key is provided at the end — try the full set before checking it.

Part A — Topic-wise challenge questions

Organism and Its Environment

1. What is an ecological niche?
2. Differentiate between habitat and niche.
3. Describe how organisms interact with their environment.

Major Abiotic Factors

1. Name the major abiotic factors.
2. How does temperature affect organisms?
3. Describe the major abiotic factors that affect organisms.

Responses to Abiotic Stress

1. Differentiate between conformers and regulators.
2. What is diapause?
3. Describe the responses of organisms to abiotic stress.

Adaptations

1. What are adaptations?
2. Give two adaptations of desert plants.
3. Describe the adaptations of organisms to their environment.

Population Attributes

1. What is population density?
2. Name the attributes of a population.
3. Describe the attributes of a population.

Population Growth

1. What is the exponential growth equation?
2. Explain logistic growth and the role of K .
3. Describe how resources limit population growth.

Life History Variation and Population Interactions

1. Define mutualism.
2. What is Gause's competitive exclusion principle?
3. Describe the major population interactions with examples.

Part B — Integrated problems (multi-topic)

1. Describe the adaptations of organisms to their environment.
2. Describe population growth models and population interactions.
3. Explain the major population interactions with suitable examples.
4. Describe the major abiotic factors that affect organisms.
5. Explain the exponential and logistic growth models.
6. Differentiate between conformers and regulators with examples.

Answer Key

Organism and Its Environment

An ecological niche is the functional role of a species; the environment has biotic and abiotic components; habitat is the physical place.

Major Abiotic Factors

Temperature, water, light and soil; temperature and water determine the distribution of organisms.

Responses to Abiotic Stress

Conformers change with the environment; regulators maintain a steady internal state; responses include hibernation, aestivation, diapause and migration.

Adaptations

Features that improve survival; desert plants reduce water loss; polar animals have blubber for insulation.

Population Attributes

Density, natality, mortality, age distribution and sex ratio.

Population Growth

Exponential: $dN/dt = rN$; logistic: $dN/dt = rN[(K - N)/K]$, limited by carrying capacity K .

Life History Variation and Population Interactions

Mutualism (+/+), commensalism (+/0), predation and parasitism (+/-), competition (-/-); Gause's principle governs coexistence.

Integrated problems

1: Structural, physiological and behavioural adaptations. 2: Exponential vs logistic; mutualism, commensalism, predation, parasitism, competition. 3: Examples for each interaction. 4: Temperature, water, light, soil. 5: $N(t) = N_0 e^{rt}$; $dN/dt = rN[(K - N)/K]$. 6: Regulators maintain constants; conformers do not.