SmartKalike

CBSE Class 12 · Biology

Organisms and Populations

10 most probable questions for Boards 2027

Q1. 1 mark · Multiple choice

At which level does natural selection operate to evolve traits in response to environmental change? (1 mark)
(A) Individual organism
(B) Population
(C) Organ system
(D) Ecosystem only

Answer

(B) Population — natural selection operates at the population level to evolve desired traits.

Q2. 2 marks · Short answer

Define a population. Include the area occupied and the relationship among its members; state whether groups reproducing asexually can also be treated as populations in ecological studies. (2 marks)

Answer

A population is a group of individuals of a species living in a well-defined geographical area, sharing or competing for similar resources and potentially interbreeding; groups produced by asexual reproduction are also considered populations in ecological studies.

Q3. 3 marks · Medium answer

Write the equation for population density at time t + 1 in terms of births, immigration, deaths and emigration. Also identify the growth curve produced under unlimited resources. (3 marks)

Answer

$N_{t+1} = N_t + [(B + I) - (D + E)]$

The population density at t + 1 is calculated from its density at time t, with births and immigration added and deaths and emigration subtracted. Here, B and I represent births and immigrants, while D and E represent deaths and emigrants. Unlimited resources produce exponential growth, whose plot is a J-shaped curve.

Q4. 5 marks · Long answer

For exponential growth, write the differential and integrated growth equations and explain their symbols. Then define carrying capacity and state the resource conditions under which logistic growth occurs. (5 marks)

Answer

With unlimited resources, a population can grow exponentially; finite resources make logistic growth more realistic.

1. The differential equation for exponential growth is $dN/dt = (b - d) \times N$, or $dN/dt = rN$. Here, dN/dt is the change in population density per unit time, b and d are per-capita birth and death rates, and $r = b - d$ is the intrinsic rate of natural increase.
2. The integrated equation is $N_t = N_0 e^{rt}$. N_t is population density after time t, N_0 is population density at time zero, r is the intrinsic rate of natural increase, and e is the base of natural logarithms (2.71828).
3. Carrying capacity (K) is the maximum possible number of individuals that a given habitat can support.
4. Logistic growth occurs when resources are limited and competition develops. Population growth passes through lag, acceleration and deceleration phases, then reaches an asymptote at K, forming a sigmoid curve.

The logistic growth model is more realistic for populations whose resources are finite and become limiting.

Q5. 1 mark · Multiple choice

Which statement describes the sex ratio of a population? (1 mark)
(A) The number of births per individual per unit time
(B) The proportion of males and females in the population
(C) The percentage of individuals in each age group
(D) The number of individuals per unit area

Answer

(B) The proportion of males and females in the population — a population has a sex ratio, such as 60 per cent females and 40 per cent males.

Q6. 2 marks · Short answer

What do birth rate and death rate refer to in a population? Explain what is meant by expressing these rates per capita. (2 marks)

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/biology/organisms-and-populations

Q7. 3 marks · Medium answer

Describe three beneficial roles of predators in ecosystems, including how predation transfers energy and how predators can affect prey populations and community diversity. Give a relevant example. (3 marks)

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Q8. 5 marks · Long answer

Describe (i) how host-specific parasites and their hosts may coevolve, (ii) the adaptations and life-cycle features that help parasites succeed, and (iii) the effects parasites may have on their hosts.

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Q9. 1 mark · Multiple choice

Which description best matches logistic population growth? (1 mark)

(A) A J-shaped curve that continues without limit

(B) A sigmoid curve that levels off at carrying capacity after lag, acceleration and deceleration phases

(C) A straight line caused by constant immigration

(D) A declining curve that cannot reach an asymptote

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/biology/organisms-and-populations

Q10. 2 marks · Short answer

What is an age pyramid, and what can its shape indicate about a population? (2 marks)

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