

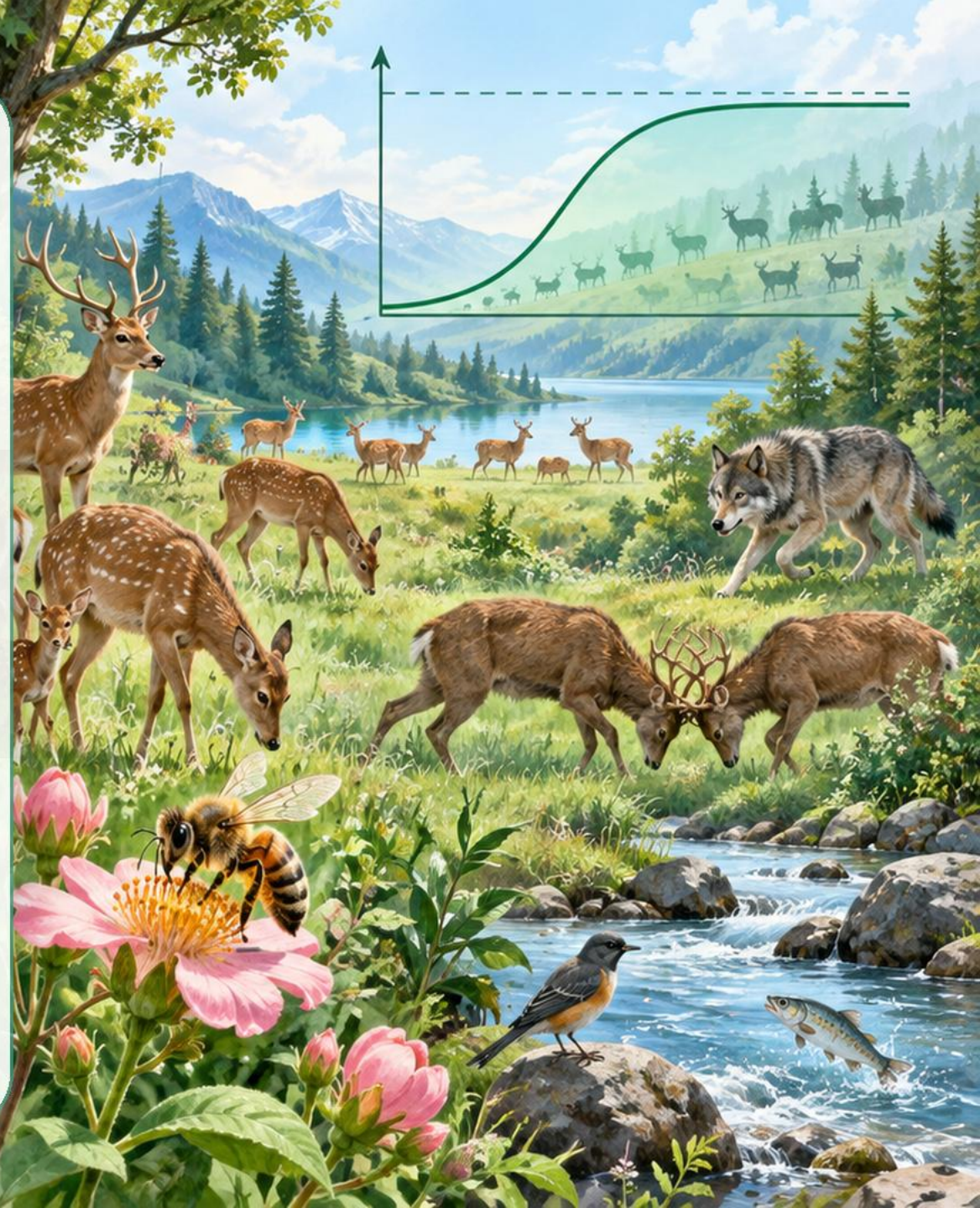
BIOLOGY • CLASS 12

11

CHAPTER

Organisms and Populations

NCERT SOLUTIONS



EXERCISE SOLUTION: QUESTION 1

1. List the attributes that populations have but individuals do not.

Answer:

- Population density: the number of individuals per unit area or volume.
- Birth rate (natality): births per individual in a stated time.
- Death rate (mortality): deaths per individual in a stated time.
- Sex ratio: the relative proportions of males and females.
- Age distribution: the proportions of pre-reproductive, reproductive and post-reproductive individuals.
- Population growth rate: the change in population size with time.

An individual has an age and may give birth or die, but these rates and proportions describe the population as a whole.

EXERCISE SOLUTION: QUESTION 2

2. A population growing exponentially doubles in size in 3 years. What is its intrinsic rate of increase?

Answer:

Given:

$$N_t = 2N_0; \quad t = 3 \text{ years}$$

Exponential growth equation:

$$N_t = N_0 e^{rt}$$

Substitution:

$$2N_0 = N_0 e^{rt}$$

$$2 = e^{rt}$$

$$\ln 2 = rt$$

$$r = \frac{\ln 2}{t} = \frac{0.6931}{3 \text{ years}}$$

Answer:

$$r \approx 0.231 \text{ year}^{-1}$$

This is the intrinsic rate of natural increase for the exponential-growth model.

EXERCISE SOLUTION: QUESTION 3

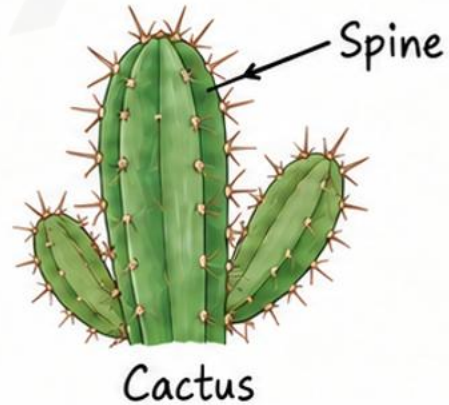
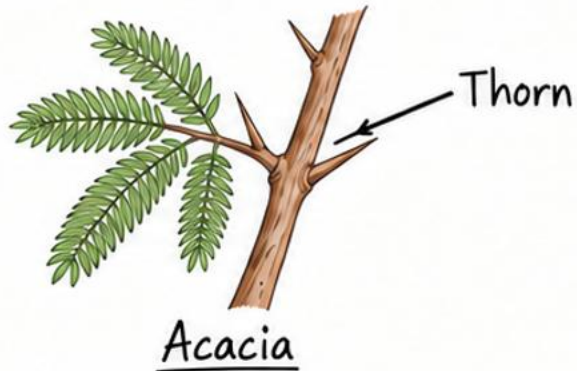
3. What are important defence mechanisms of plants against herbivory?

Answer:

Structural defences

Thorns, spines and tough or hairy surfaces make feeding difficult.

Thorns in Acacia and spines in cacti help deter herbivores.



Chemical defences

Plants may produce toxic, bitter or feeding-deterrent chemicals.

Calotropis produces poisonous cardiac glycosides.

Nicotine, caffeine and quinine are other plant chemicals that can discourage feeding.



These defences reduce damage and increase the plant's chance of survival.

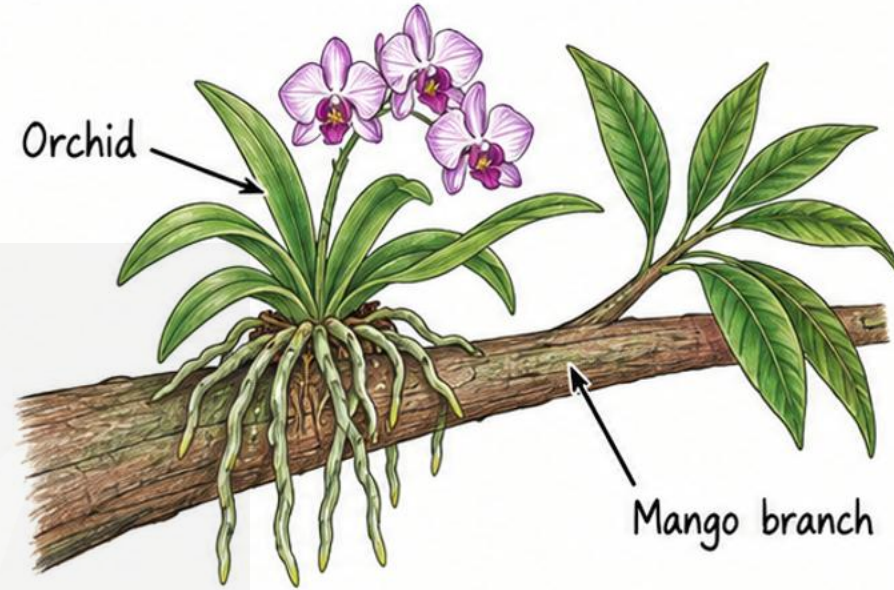
EXERCISE SOLUTIONS: QUESTIONS 4 & 5

4. An orchid grows on a branch of a mango tree. How would you describe this interaction?

Answer: It is commensalism. The orchid gains support and better access to light. The mango tree is neither significantly helped nor harmed.

The orchid is an epiphyte, not a parasite; it does not obtain food from the mango tree.

Orchid: + Mango tree: 0



5. What ecological principle is involved in the biological control of pest insects?

Answer: It uses natural enemies, especially predator-prey relationships. Predators feed on pest insects and help keep pest populations under control.

For example, ladybirds feed on aphids.

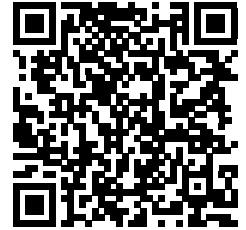


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