

NCERT Solutions for Class 12 Biology

Chapter 11 – Organisms and Populations

11.1

List the attributes that populations possess but not individuals.

Ans: A population is characterized as a collection of individuals of the same species cohabiting within a specific geographic region concurrently. For instance, all persons residing in a specific location at a specific moment constitute the human population. The primary traits or characteristics of a population inhabiting a specific location are:

- **Birth Rate (Natality):** It is the proportion of live births per thousand individuals in a specified region. The expression quantifies the ratio of individuals introduced to the population relative to its existing members.
- **Death Rate (Mortality):** This metric represents the proportion of deaths within a specific population relative to the total population size. It is articulated as the attrition of persons relative to the demographic age cohorts of the population. The age distribution pattern is typically depicted using age pyramids.
- **Population Density:** It is defined as the quantity of individuals within a population per unit of space at a specific period.
- **Sex ratio:** It is the number of males or females per thousand individuals.

11.2

If a population growing exponentially double in size in 3 years, what is the intrinsic rate of increase (r) of the population?

Ans: Given that population doubles in 3 years

$$\Rightarrow N_t = 2N_0 \text{ and } t = 3 \text{ years}$$

$$\text{We know, } N_t = N_0 e^{rt}$$

$$\Rightarrow 2N_0 = N_0 e^{r3}$$

$$\Rightarrow e^{3r} = 2$$

Take natural log on both sides,

$$3r = \ln 2$$

$$\Rightarrow r = (\ln 2)/3 = 0.693/3 = 0.231 \text{ per year.}$$

11.3

Name important defence mechanisms in plants against herbivory.

Ans: Wild creatures have a variety of defense mechanisms against predators. However, because they are immobile, plants develop mechanisms for protecting themselves from herbivory. Chemical toxic substances such as nicotine from the plant that produces tobacco, morphine from the poppy that produces opium, and strychnine, a poison from the tropical vine, are their primary defenses. In addition to these compounds, the existence of spinal cords (a modified version of leaflets) along the leafy parts of plant branches, and leaves that have been transformed into thorns, as well as the formation of pointed silicated margins on the leaves, are frequent defense mechanisms that shield the foliage from predator adverse effects.

11.4

An orchid plant is growing on the branch of mango tree. How do you describe this interaction between the orchid and the mango tree?

Ans: Epiphytes, or vegetation that blooms on other kinds of vegetation or forests, include orchids that thrive on the branches of mango trees. This kind of contact is called commensalism, and it benefits orchids while having no effect on mango trees. The trunk of the mango tree doesn't suffer in any capacity, and the flowering orchid that grows on its limb receives more sunlight for development purposes. Commensalism has become an association involving two usually coexisting species of plants or animals in the event that one organism gains from the relationship, whereas the other species is not greatly impacted.

11.5

What is the ecological principle behind the biological control method of managing with pest insects?

Ans: The predator-prey interaction serves as the environmental foundation for the biological prevention approach to pest bug management. The expression "biological control" was first used by Harry Scott Smith at the Pacific Slope Section of the Scientific American Association conference around California in 1919. This is predicated entirely on the predator's capacity to control the number of victims. The concept of predation or a parasitic relationship is the sole foundation of the biological management approach.

11.6

Define population and community.

Ans: The aggregate amount of people who belong to an animal species or another kind of creature in a particular region or ecosystems, or a collection of members of the same breed across an ecosystem, is referred by the term the population as a whole. A naturally existing group of organisms residing in a specific location or environment is referred to as a group of organisms.

11.7

Define the following terms and give one example for each:

(a) Commensalism

(b) Parasitism

(c) Camouflage

(d) Mutualism

(e) Interspecific competition

Ans: (a) The relationship among creatures of distinct types that results in one species receiving advantages while the other group doesn't seem to suffer damage is known as commensalism. *Escherichia coli*, for instance, is a type of bacterial organism that aids in processing and is found in the human body's massive intestinal tract.

(b) A parasite is a living creature that dwells on or within the physical structure of a different creature, from which it feeds. Human infections encompass, for instance, bacteria, fungi, protozoan organisms, insects & parasites.

(c) A substantial amount of resemblance among a living creature & its sensory surroundings allows for concealment, making it possible for concealment or disguising. For instance, in some situations, opponents may find it difficult to identify fauna having contrastingly colored necks & heads.

(d) Mutual dependence denotes a relationship in which the two animals of distinct species gain from one another. Since numerous organisms were sterile by nature, for instance, the pollen exchange or cross-fertilization that occurs in plant blooms by insects (and occasionally by raptors) constitutes a reciprocal process of widespread frequency & major significance.

(e) Whenever there is a shortage of an environmental asset, interactions among organisms that have access to the situation might be characterized as interspecific rivalry. One species' domination over another different one is frequently the outcome of interrelated conflict. For

instance, a single variety of *Paramecium* invariably goes extinct when 2 species—*Paramecium caudatum* & *P. aurelia*—are kept in tight vessels containing a set quantity of nourishment.

11.8

With the help of suitable diagram describe the logistic population growth curve.

Ans: Competition between species may be used to describe relationships among microorganisms that are granted accessibility to a particular circumstance where the situation involves a lack of an ecological advantage. The result of connected warfare is often the dominance of a single species over another different one. For example, when two different kinds of species (*Paramecium caudatum* and *P. aurelia*) are housed in small containers with a fixed amount of food, a single variation of *Paramecium* always becomes endangered.

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The formula that follows represents the S-shaped development pattern. $\frac{dN}{dt} = rN\left[\frac{K-N}{K}\right]$

Where r = intrinsic ratio of natural enhancement, N = population density during the time period t , and K = overall carrying volume.

11.9

Select the statement which explains best parasitism.

- (a) One organism is benefited.
- (b) Both the organisms are benefited.
- (c) One organism is benefited, other is not affected.
- (d) One organism is benefited, other is affected.

Ans: (d) One organism is benefited, other is affected.

When two species interact, one species (the parasite) gains from the other. This is known as parasitism. The host, or other species, is injured. For instance, the body is home to parasites such as lice and ticks. This indicates that there is a relationship between parasites and the human body that benefits both ticks and parasites (because they feed on human blood). These parasites, however, damage the human body and lower host fitness.

11.10

List any three important characteristics of a population and explain.

Ans: The 3 vital features to be considered during population metrics can be described as:

(a) Density: The quantity of people per unit area or region. For instance, the quantity of amphibians available on a square meter in a dense woodland area.

(b) Natality or Birth Rate: The total number of people produced to a particular community over an extended period is known as the fertility rate.

(c) Mortality or Death Rate: Any population's decline throughout a specific time is represented by the death percentage, often known as mortality. Human deaths in an overall population are typically represented via particular mortality, also known as the average mortality within a particular age range. Thus, particular mortality provides a measure of mortality within an individual's lifetime.