
#489272

Topic: Organisms and environment

Give reasons.

Quarrying can become a major environmental concern.

Solution

Quarrying is the commercial extraction of building raw material, stones and marbles. It can become a major environmental concern due to the following reasons:

- 1) Fine dust particles which spread in the air around a quarrying site causes air pollution and respiratory problems.
- 2) It produces noise pollution because of the heavy machinery and the blasts to break huge chunks of rocks.
- 3) Blasting often generates vibration which may damage the nearby buildings or similar structures.
- 4) Destroys the natural vegetation and ruins the natural habitats for plants and animals.

#489291

Topic: Organisms and environment

Horticulture means

- A
- Growing of fruits and vegetables
-
-
- B
- Primitive farming
-
-
- C
- Growing of wheat
-
-
- D
- None of the above

Solution

Horticulture is the science and art of cultivating fruits, vegetables, flowers, or ornamental plants. It also includes plant conservation, landscape restoration, soil management, landscape and garden design, construction, and maintenance.

#526085

Topic: Population

What are the suggested reasons for population explosion?

Solution

The human population is increasing day by day. Population explosion refers the sudden and rapid rise in the size of the population, especially human population. The reason for population explosion include;

- (a) Decreased death rate and improved life-expectancy due to better medical facilities.
- (b) Increased birth rate and decreased infant mortality rate.

#526231

Topic: Organisms and environment

How is diapause different from hibernation?

Solution

Diapause is a condition of suspended development exhibited by species of zooplankton and insects. This is done so that they can pass over the unfavorable conditions which are present during their development.

Whereas hibernation also known as winter sleep is a resting stage shown by bats, squirrels and rodents. This is done to escape the winter season by slowing down their metabolism. Therefore they enter a stage of inactivity by hiding them in shelters.

#526235

Topic: Organisms and environment

Define phenotypic adaptation. Give one example.

Solution

Phenotypic adaptations refer to changes in the appearance of organisms as a result of genetic mutation. Evolution of light colored moth in dark colored population is a phenotypic adaptation that impart it a survival advantage in polluted areas.

#526240

Topic: Organisms and environment

Most living organisms cannot survive at temperature above 45°C. How are some microbes able to live in habitats with temperatures exceeding 100°C?

Solution

The optimum temperature for the survival of the bacterium is about 45° C. Some of the microbes like bacteria and archaeobacteria can survive in high-temperature zones. These organisms are known as thermophiles which can tolerate the temperature of about 100° C. These organisms have developed certain thermo-resistant enzymes which help them to carry out the normal metabolism at higher temperatures without getting degraded. Some of the bacteria can form bacterial endospores which are resistant structures. These endospores are not degraded or damaged by heat and other stressful environments.

#526243

Topic: Population

List the attributes that populations but not individuals possess.

Solution

The population is the group of individuals of the same species that live in a particular area. Birth rate, death rate, age distribution pattern, sex ratio and population density are attributes of a population but not of an individual.

#526247

Topic: Population

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

Solution

A population grows exponentially if enough food resources are available to the individual.

Exponential growth equation:

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

Where,

N_t = Population density after time t

N_o = Population density at time zero

r = Intrinsic rate of natural increase

e = Base of natural logarithms (2.71828)

From the above equation, we can calculate the intrinsic rate of increase (r) of a population.

Now, as per the question,

Present population density = x

Then,

Population density after two years = 2x

t = 3 years

Substituting these values in the formula, we get:

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

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

Applying log on both sides:

$$\Rightarrow \log 2 = 3r \log e$$

$$\Rightarrow \frac{\log 2}{3 \log e} = r$$

$$\Rightarrow \frac{\log 2}{3 \times 0.434} = r$$

$$\Rightarrow \frac{0.301}{3 \times 0.434} = r$$

$$\Rightarrow \frac{0.301}{1.302} = r$$

$$\Rightarrow 0.2311 = r$$

Hence, the intrinsic rate of increase for the above-illustrated population is 0.2311.

#526250

Topic: Organisms and environment

Name important defence mechanisms in plants against herbivory.

Solution

Plants have morphological and chemical defenses against herbivory. Leaf modification into spines, presence of sharp thorns and spiny leaf margins are some of the morphological defenses. Chemical defense mechanisms include the production of phytoalexins and constitutive compounds by plants. These are the secondary chemical compounds that serve as toxins/ disturb metabolism or normal development of larva or reduce the digestibility of plant. For example, mustard oil from mustard plants, milky sap from milkweed family plants.

#526253

Topic: Population

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

Solution

Orchids are epiphytes. These are the autotrophic plants that lack mechanical tissues and grow on the surface of some other supporting plants. Orchid growing on mango tree derive support from the tree but do not derive nutrition from it. It represents commensalism wherein orchid plant is getting support from its association with mango tree while the later is not affected.

#526256

Topic: Population

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

Solution

Biological control of pest management exploits predation. Predation is the ecological interaction between predators and preys where predators drives energy from preys. By this control method predator keeps the population size of pest and insects under control.

#526261

Topic: Organisms and environment

Distinguish between the following:

- (a) Hibernation and Aestivation
- (b) Ectotherms and Endotherms

Solution

a) Hibernation is the winter sleep. In winter some animals go into very deep sleep and during sleep metabolic rate slows down to save energy. It also lowers their body temperature than normal. It occurs for the long duration. For example, bear, tortoise, ground squirrel and many reptiles. Whereas aestivation is the summer sleep. During summer some animals go into the deep sleep to protect themselves from high temperature. It is a quite smaller duration. For example, frog, desert lizards etc.

b) Ectotherms are those organisms that not able to maintain a constant temperature so, their body temperature fluctuates with environment temperature. They are also called cold blooded animals or poikilotherms. For example, fish, amphibians. Whereas endotherms are those that maintains their constant body temperature also called warm-blooded animals or homeothermic. For example, birds and mammals.

#526272

Topic: Organisms and environment

Write a short note on

- (a) Adaptations of desert plants and animals
- (b) Adaptations of plants to water scarcity
- (c) Behavioural adaptations in animals
- (d) Importance of light to plants
- (e) Effect of temperature or water scarcity and the adaptations of animals.

Solution

a) Adaptations of desert plants and animals-

1. In the desert, the plants are succulent and store water in fleshy leaves, stems or roots. The root system is highly developed for water absorption. In these plants the stem also performs photosynthesis. They have a thick cuticle on stems and leaves which protect from excessive transpiration. Desert plants follow the CAM pathway to prevent excessive water loss.

2. In the desert, animals show various adaptations. Reptiles such as snakes come in the open only at dawn or dusk. Some small desert animals live in burrows to escape the heat. Animals such as camels store fat in their hump. This helps them survive for a long time without food and water.

b) Adaptations of plants to water scarcity

Xerophytic plants are the plants that can survive water scarcity. They have the following adaptations. A thick cuticle on stems and leaves which protect from excessive transpiration. These plants show the presence of sunken stomata which reduce the loss of water. There are certain thick walled cells of hypodermis which do not allow the passage of water and prevent water loss. The leaves are reduced in size and may be modified to form the spines that reduce the surface area for transpiration. The root system is highly developed for water absorption. In these plants the stem also performs photosynthesis.

c) Behavioral adaptations in animals

Animals show various behavioral adaptations depending on the region.

Animals can be endotherms or ectotherms.

The animals that maintain a constant body temperature independent of the environment are called warm-blooded animals or endotherms. The animals that cannot maintain a constant body temperature and change it in accordance with the external environment are said to be cold blooded or ectotherms.

Aestivation and hibernation are also behavioral adaptations. The state of dormancy in some animals during winter is called hibernation. In these animals, the heart rate, metabolic rate and breathing rate is decreased. Aestivation is a response towards high temperature. It is characterized by inactivity and a lowered metabolic rate due to lack of potential to tolerate the heat.

d) Importance of light to plants

Photosynthesis is the process in which autotrophs such as green plants use carbon dioxide and water in presence of sunlight to synthesize nutrients such as carbohydrates in the form of glucose and release oxygen. Also, flowering of plants is influenced by photoperiodism.

e) Effect of temperature or water scarcity and the adaptations of animals

1. Animals living in different regions show different kinds of temperature adaptations.

Animals found in colder regions have a large amount of subcutaneous fat and thick fur coat, short ears and limbs to prevent heat loss from their body.

Animals found in the desert also show various adaptations. Camels store fat in their hump. This helps them survive for a long time without food and water. Reptiles such as snakes come in the open only at dawn or dusk. Some small desert animals live in burrows to escape the heat.

2. Animals that live in the desert have to face water scarcity and high temperatures. Animals such as camels store fat in their hump. This helps them survive for a long time without food and water. Animals such as the Kangaroo rat never drink water in its entire life.

#526279

Topic: Organisms and environment

Give an example for:

- (a) An endothermic animal
- (b) An ectothermic animal
- (c) An organism of benthic zone

Solution

(a) Endothermic animals are those animals that maintain constant body temperature e.g., mammals and birds like the parrot.

(b) Ectothermic animals are those animals in which the regulation of the body temperature depends on the external environment e.g., reptiles like snake and amphibians like the frog.

(c) Benthic zone is the deepest zone of the ocean e.g., sea anemone.

#526280

Topic: Population

Define population and community.

Solution

The population is individuals of same species that occupy a specific area. A species can have one or more than one population. The community is the group of populations of different species living together in a habitat.

#526284

Topic: Population

Define the following terms and give one example for each:

- (a) Commensalism
- (b) Parasitism
- (c) Camouflage
- (d) Mutualism
- (e) Interspecific competition

Solution

- (a) Commensalism refers to the association of organisms wherein one organism is benefitted while other remains unaffected. For example, Whale and barnacles
- (b) Parasitism is an association of organisms where one organism is benefitted at the expense of other. For example, lice in the scalp of the human.
- (c) Camouflage refers to adaptation wherein organisms blend themselves with certain surroundings to avoid predators. A walking stick insect camouflage itself to disguise.
- (d) Mutualism is an association of organisms wherein both are benefitted. For example, *Rhizobium* and legumes.
- (e) Interspecific competition refers to competition between organisms of two different species for a common resource. For example, competition between leopard and lion for common prey.

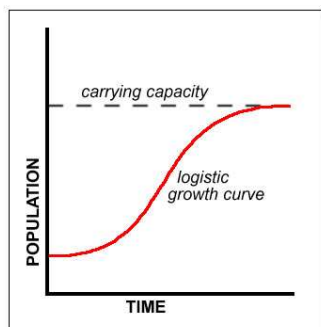
#526287

Topic: Population

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

Solution

The logistic growth curve (S-shaped curve) shows population growth when resources are limited. Limited natural resources pose competition among individuals. It is characterized by initial lag phase followed by an increase and then asymptote when the population obtains its carrying capacity (K).



#526293

Topic: Population

Select the statement which explains best parasitism.

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

Solution

Parasitism is an association of organisms where one organism is benefitted at the expense of other. Whereas, the association of organisms wherein one organism is benefitted while other remains unaffected is called as Commensalism. Mutualism is the association of organisms wherein both are benefitted. There is no negative effect of association on another organism. Thus, the correct answer is D.

#526294

Topic: Population

List any three important characteristics of a population and explain.

Solution

The three important characteristics of a population are

1. Natality is the rate of production of new individuals per unit population per unit time through birth. It is also called as birth rate and can be calculated as a number of births in year per thousand individuals. The higher the natality more is the increase in the population.

$$Natality = \frac{\text{Number of birth}}{\text{Total number of individuals in a population}} \times 1000$$

2. Mortality is the loss of new individuals per unit population per unit time through death. It is also called as death rate and can be calculated as a number of deaths in a year per thousand individuals. The higher the mortality more is the decrease in the population.

$$Mortality = \frac{\text{Number of death}}{\text{Total number of individuals in a population}} \times 1000$$

3. Age distribution is the numbers of individuals in various age categories in a given population. It includes the number of people in the pre- reproductive, reproductive and post-reproductive group.

These are the key factors in determining whether a population is increasing, decreasing or stable.

#526309

Topic: Population

How do ecologists estimate the total number of species present in the world?

Solution

Species richness is calculated by the researcher by statistical comparison between the species of the different region such as tropical and temperate. For example, insect richness of temperate and tropical regions is calculated for the purpose as these biomes constitute the dominant biomes and insect species are easy to catch, visible and calculate. And then the obtained ratios are extrapolated to calculate the species richness of other plants and animal species.