

Markhor Junior Contest ®

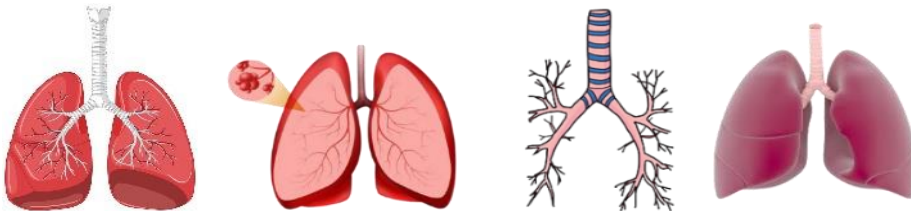
Aspirant Level (Class IX, X, O/A Level) Science 2008

There are 25 questions, and each question carries two marks.

1. **Which statement is true regarding microbial ecology?**
 - A) Microbial interactions are always harmful
 - B) Microbes influence nutrient cycles, ecosystem function, and host health**
 - C) Microbial communities are static and unchanging
 - D) Microbes exist only in extreme environments
2. **Reducing antibiotic resistance requires:**
 - A) Improved diagnostics to avoid unnecessary prescriptions
 - B) Infection control measures
 - C) Development of new antibiotics
 - D) All of the above**
3. **Antibiotics are generally ineffective against:**
 - A) Bacterial infections
 - B) Fungal infections
 - C) Viral infections**
 - D) Protozoan infections
4. **Mitigation of acid rain involves:**
 - A) Reducing NO_x and SO_x emissions from industrial sources**
 - B) Increasing methane production
 - C) Deforestation
 - D) Using more fossil fuels
5. **Which of the following human activities directly reduces genetic diversity?**
 - A) Deforestation and habitat fragmentation**
 - B) Captive breeding programs
 - C) Protected area creation
 - D) Ecological restoration
6. **Comparative genomics can reveal:**
 - A) Evolutionary relationships and conserved genes among species**
 - B) Only extinct organisms' traits
 - C) Geological dating of rocks
 - D) Morphological changes without DNA information
7. **Which example demonstrates co-evolution?**
 - A) Flowering plants and their pollinators evolving together**
 - B) Fish developing antifreeze proteins
 - C) Bacteria evolving antibiotic resistance
 - D) Birds migrating seasonally

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8. Multiple sclerosis (MS) is caused by:
- A) Accumulation of beta-amyloid plaques
 - B) Autoimmune-mediated demyelination of CNS neurons**
 - C) Loss of dopamine in substantia nigra
 - D) Overproduction of acetylcholine
9. Which statement about infectious and non-infectious diseases is correct?
- A) Non-infectious diseases can spread between individuals
 - B) Infectious diseases are caused by pathogens and can be contagious**
 - C) Infectious diseases cannot be prevented by vaccination
 - D) Non-infectious diseases are always acute
10. An mRNA vaccine works by:
- A) Introducing weakened pathogens directly
 - B) Introducing DNA into the host genome
 - C) Providing instructions for host cells to produce a pathogen-specific antigen**
 - D) Blocking T cell activation
11. Which respiratory structure allows one-way airflow in birds, increasing efficiency over mammalian lungs?
- A) Alveoli
 - B) Air sacs**
 - C) Bronchioles
 - D) Trachea



12. Stem cells in regenerative medicine are used for:
- A) Repairing damaged tissues or organs**
 - B) Producing biopesticides
 - C) Creating GM crops
 - D) Detecting DNA mutations
13. Which of the following best describes cisgenic modification?
- A) Introducing genes from the same or closely related species**
 - B) Introducing genes from unrelated species
 - C) Deleting all introns in a gene
 - D) Editing DNA without using RNA

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14. Which environmental influence has been strongly linked to epigenetic changes across generations in humans and animals?
- A) High altitude adaptation
 - B) Exposure to famine, toxins, and chronic stress**
 - C) Mendelian inheritance patterns
 - D) Random chromosomal crossing over
15. Which best describes epigenetic regulation?
- A) Heritable changes in gene expression without altering DNA sequence**
 - B) Random mutations in coding regions
 - C) Permanent deletion of genes
 - D) Repair of damaged DNA
16. If two traits are governed by genes located very close together on the same chromosome, what outcome is most likely?
- A) Independent assortment at high frequency
 - B) Crossing over always separates them
 - C) They are inherited together more frequently than predicted by Mendelian ratios**
 - D) They produce only recessive phenotypes
17. The “anti-codon” is found on:
- A) mRNA, pairing with DNA codons
 - B) rRNA, pairing with mRNA
 - C) tRNA, pairing with mRNA codons**
 - D) DNA, pairing with RNA codons
18. Which statement about chemiosmosis in mitochondria and chloroplasts is correct?
- A) In both, protons move through ATP synthase from a region of high concentration to low concentration.**
 - B) In both, protons are pumped into the stroma.
 - C) In both, oxygen is required to establish the proton gradient.
 - D) In both, protons accumulate inside the matrix.
19. Which is an example of endosymbiotic theory evidence for mitochondria and chloroplasts?
- A) They both have single membranes.
 - B) They can form ribosomes identical to prokaryotic ribosomes.**
 - C) They lack DNA.
 - D) They depend completely on nuclear genes for protein synthesis.

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20. Which particle contributes most to the mass of an atom?
A) Electron
B) Neutron
C) Proton
D) Photon
21. Which of the following statements is correct regarding isoelectronic species?
A) They have the same number of protons
B) They have the same number of electrons
C) They have the same atomic radius
D) They have identical ionization energies
22. Which of the following properties is not characteristic of metallic bonding?
A) Malleability
B) Electrical conductivity
C) Low melting point
D) Lustrous appearance
23. Which hybridization corresponds to octahedral geometry?
A) sp^3
B) sp^3d^2
C) sp^2
D) sp^3d
24. In a reaction, the mole ratio between reactants A and B is 1:3. If 2 moles of A are available, how many moles of B are needed for complete reaction?
A) 2 moles
B) 4 moles
C) 6 moles
D) 3 moles
25. According to collision theory, why do reactions between ions in aqueous solution often proceed rapidly?
A) Ions have strong electrostatic attractions, leading to frequent effective collisions
B) They have low mass
C) Solvent slows down collisions
D) They have high activation energy