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Level: SL IB in Biology
Subject: Biology
Topic: IB SL Biology
Type: Topic Question

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All International Baccalaureate IB Topic Questions SL Biology

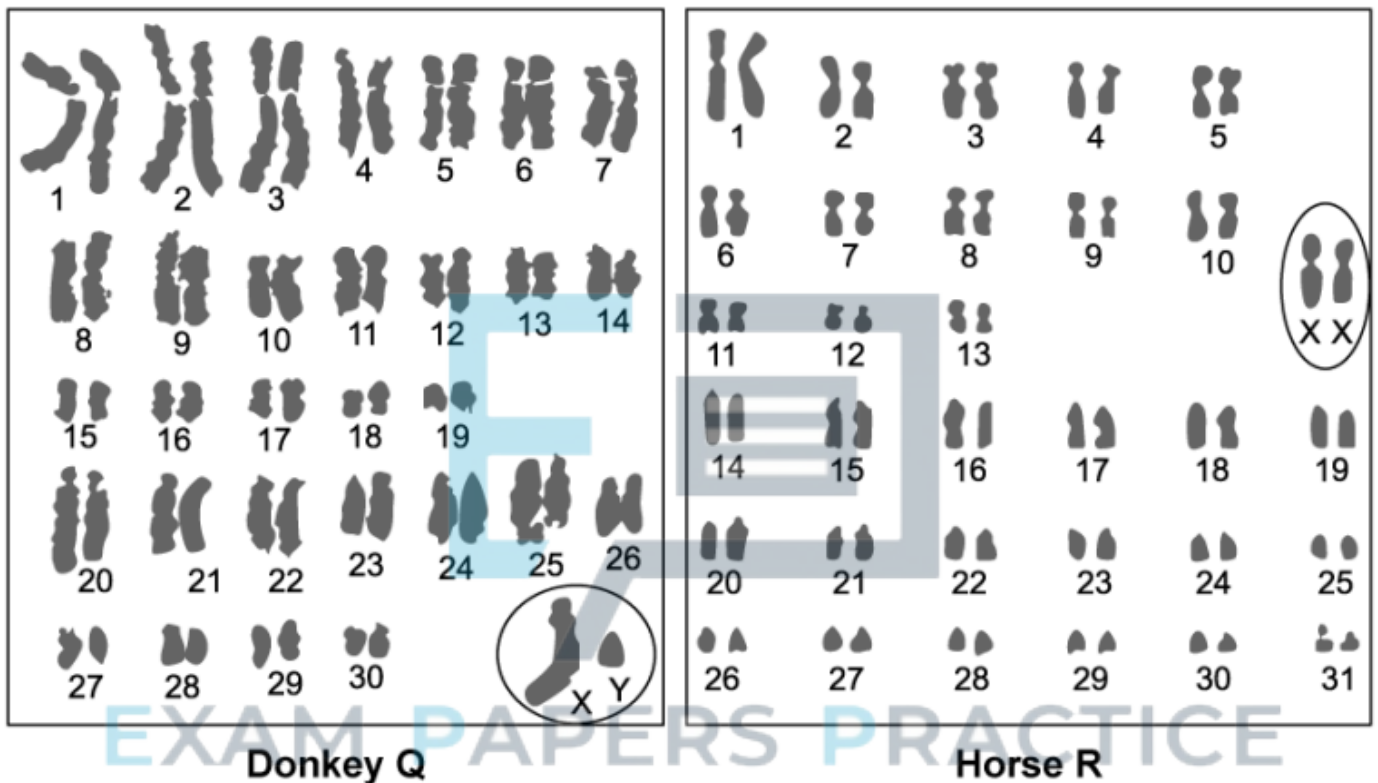
BIOLOGY

SL - IB

Key skills

Question 1.

The two karyotypes belong to a donkey (**Q**) and a horse (**R**).



Breeding these two individuals resulted in the production of a sterile mule (**S**).

Why would **S** be sterile?

- A. The sex of the mule (**S**) will be undetermined at birth due to the unnatural combination of chromosomes
- B. Different combinations of alleles formed as a result of crossbreeding **Q** and **R** which leads to disadvantageous characteristics in **S**
- C. There are different numbers of chromosomes in the gametes of **Q** and **R** so **S** would not live long enough to breed
- D. The process of meiosis will not be possible in **S** as homologous pairs cannot form

[1 mark]

Question 2.

Which of the following statements best describes the role of horizontal gene transfer in the evolution of bacterial species?

- A. It allows for the exchange of genes between organisms of different species, contributing to genetic diversity and adaptation.
- B. It leads to a permanent increase in the number of chromosomes within a bacterial cell.
- C. It occurs exclusively during sexual reproduction, facilitating genetic recombination.
- D. It results in the elimination of deleterious mutations from bacterial genomes.

[1 mark]

Question 3.

What is the significance of the Endosymbiotic Theory in understanding the origin of eukaryotic cells?

- A. It explains the evolution of prokaryotic cells from eukaryotic ancestors.
- B. It provides a model for the origin of chloroplasts and mitochondria as a result of symbiotic relationships.
- C. It describes how viruses contributed to the formation of cellular organelles.
- D. It outlines the role of genetic drift in the diversification of eukaryotic lineages.

[1 mark]

Question 4.

Which molecular technique would be most appropriate for determining the evolutionary relationships among organisms based on their DNA sequences?

- A. Gel electrophoresis
- B. Restriction fragment length polymorphism (RFLP)
- C. DNA sequencing
- D. Polymerase chain reaction (PCR)

[1 mark]

Question 5.

In cladistics, which term refers to a shared derived characteristic that is used to establish evolutionary relationships?

- A. Ancestral trait
- B. Homologous trait
- C. Synapomorphy
- D. Analogous trait

[1 mark]

Question 6.

How does the concept of genetic drift differ from natural selection in influencing allele frequencies within a population?

- A. Genetic drift leads to changes in allele frequencies due to differential survival and reproduction, while natural selection is random.
- B. Natural selection is driven by random genetic changes, whereas genetic drift is influenced by environmental pressures.
- C. Genetic drift is a stochastic process that affects small populations more strongly than large populations, whereas natural selection is a non-random process.
- D. Natural selection only affects phenotypic traits, while genetic drift affects genotypic traits exclusively.

[1 mark]

Question 7.

Which type of evidence provides the strongest support for the hypothesis of common descent among different species?

- A. The presence of similar anatomical structures across unrelated species
- B. The occurrence of convergent evolution in various ecosystems
- C. The consistency of embryonic development stages across diverse taxa
- D. The correspondence of molecular sequences, such as ribosomal RNA genes, among species

[1 mark]

Question 8.

Which principle of phylogenetics is used to infer the most likely evolutionary tree with the fewest number of changes?

- A. Maximum likelihood
- B. Parsimony
- C. Bayesian inference
- D. Neighbor-joining

[1 mark]

Question 9.

What role do transposable elements play in the evolution of genomes?

- A. They provide a mechanism for horizontal gene transfer between species.
- B. They act as catalysts for the synthesis of ribosomal RNA.
- C. They contribute to genetic variation by causing mutations and facilitating gene rearrangements.
- D. They are involved in the degradation of redundant genetic material.

[1 mark]

Question 10.

Which of the following statements about the three-domain system of classification is true?

- A. The three-domain system groups all prokaryotic and eukaryotic organisms into a single domain.
- B. The system recognizes Archaea, Bacteria, and Eukarya as distinct domains with fundamentally different cellular structures.
- C. The three-domain system is based solely on differences in ribosomal RNA sequences between prokaryotes.
- D. The classification into three domains is based exclusively on the presence or absence of cell walls.

[1 mark]

Question 11.

Which factor is most likely to lead to the formation of a new species through allopatric speciation?

- A. A genetic mutation that occurs in a single individual within a population
- B. The migration of a population to a new geographic area that is physically isolated from the original habitat
- C. The hybridization of two distinct species in a shared environment
- D. The random mating of individuals within a large, continuously distributed population

[1 mark]

Question 12.

Which of the following statements about the role of molecular clocks in phylogenetics is accurate?

- A. Molecular clocks are used to estimate the age of fossils based on morphological traits.
- B. Molecular clocks measure the rate of nucleotide substitutions to estimate divergence times between species.
- C. Molecular clocks rely on the analysis of protein structures to infer evolutionary relationships.
- D. Molecular clocks are based on the frequency of gene duplications and deletions across different taxa.



[1 mark]

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