MCAT Molecular Biology Quiz Answer Key PDF

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Which of the following processes occurs in the mitochondria?

A. Glycolysis
B. Transcription
C. Krebs cycle ✓
D. DNA replication

What type of bond links amino acids together in a protein?

A. Hydrogen bond
B. Ionic bond
C. Peptide bond ✓
D. Disulfide bond

Which enzyme is responsible for unwinding the DNA double helix during replication?

A. DNA polymerase
B. Helicase ✓
C. Ligase
D. Primase

Which phase of the cell cycle is characterized by DNA replication?

A. G1 phase
B. S phase ✓
C. G2 phase
D. M phase

Which hormone is primarily involved in regulating blood glucose levels?

A. Thyroxine
B. Insulin ✓
C. Adrenaline
D. Estrogen

What is the main purpose of the Hardy-Weinberg equilibrium in population genetics?

A. To describe the energy flow in ecosystems
B. To calculate mutation rates
C. To predict allele frequencies in a non-evolving population ✓
D. To determine genetic drift effects

Which of the following are types of RNA involved in protein synthesis?

A. mRNA ✓
B. tRNA ✓
C. rRNA ✓
D. siRNA

Which of the following is a purine base found in DNA?

A. Thymine
B. Cytosine
C. Adenine ✓
D. Uracil

Which of the following are products of glycolysis?

A. ATP ✓
B. NADH ✓
C. Pyruvate ✓
D. CO_2

Which of the following are components of the cell membrane?

A. Phospholipids ✓
B. Cholesterol ✓

C. Nucleic acids

D. Proteins ✓

Which of the following processes are involved in cellular respiration?

A. Glycolysis ✓

B. Electron transport chain ✓

C. Photosynthesis

D. Krebs cycle ✓

Discuss the role of the immune system in distinguishing self from non-self.

The immune system distinguishes self from non-self primarily through the recognition of unique molecular patterns, such as antigens, on pathogens, while employing mechanisms like tolerance to avoid attacking the body's own cells.

Describe the process of transcription and the role of RNA polymerase.

During transcription, RNA polymerase binds to the promoter region of a gene, unwinds the DNA double helix, and synthesizes a single strand of RNA by adding RNA nucleotides complementary to the DNA template strand, ultimately producing messenger RNA (mRNA) that carries the genetic code for protein synthesis.

Which factors can affect enzyme activity?

A. Temperature ✓

B. pH ✓

C. Substrate concentration ✓

D. Light intensity

Explain the central dogma of molecular biology and its significance.

The central dogma of molecular biology states that genetic information flows from DNA to RNA through transcription, and from RNA to protein through translation, which is essential for cellular function and gene expression.

Which of the following are mechanisms of genetic variation?

A. Crossinging over ✓

B. Independent assortment ✓

C. Binary fission

D. Mutation ✓

How do competitive and non-competitive inhibitors affect enzyme activity?

Competitive inhibitors decrease enzyme activity by blocking the active site, while non-competitive inhibitors reduce activity by binding elsewhere on the enzyme.

What are the key differences between mitosis and meiosis in terms of their outcomes?

1. Mitosis results in 2 identical diploid cells; Meiosis results in 4 diverse haploid cells. 2. Mitosis involves 1 division; Meiosis involves 2 divisions.

Explain how epigenetic modifications can influence gene expression without altering the DNA sequence.

Epigenetic modifications influence gene expression through mechanisms like DNA methylation, which adds methyl groups to DNA, and histone modifications, which alter the structure of histones around which DNA is wrapped, affecting the accessibility of genes for transcription.

What is the primary function of ribosomes in the cell?

A. DNA replication

B. Protein synthesis ✓

C. Lipid metabolism

D. Carbohydrate storage