

Ch.2 Self-Quiz Biology Answer Key PDF

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What is the primary function of the ribosome in the cell?

- A. DNA replication
- B. Protein synthesis ✓**
- C. Lipid synthesis
- D. Energy production

Which of the following are functions of proteins in the cell?

- A. Enzyme catalysis ✓**
- B. Genetic information storage
- C. Structural support ✓**
- D. Energy storage

Explain the process of DNA replication and the role of enzymes involved in this process.

The process of DNA replication begins with the unwinding of the double helix by the enzyme helicase, which separates the two strands of DNA. DNA polymerase then synthesizes new strands by adding complementary nucleotides to each template strand. Other enzymes, such as primase, lay down RNA primers to initiate synthesis, while ligase seals any gaps between Okazaki fragments on the lagging strand. This results in two identical DNA molecules, each containing one original and one newly synthesized strand.

Which of the following is a characteristic of prokaryotic cells?

- A. Presence of a nucleus
- B. Membrane-bound organelles
- C. Circular DNA ✓**
- D. Large size compared to eukaryotic cells

Which organelles are involved in energy conversion within the cell?

- A. mitochondria ✓**
- B. Ribosomes
- C. Chloroplasts ✓**
- D. Golgi apparatus

Discuss the importance of the cell membrane's structure in maintaining homeostasis within the cell.

The cell membrane's selective permeability allows it to control the internal environment of the cell, ensuring that essential nutrients enter, waste products exit, and the overall balance of ions and molecules is maintained.

What is the main purpose of photosynthesis?

- A. To produce ATP for cellular activities
- B. To convert solar energy into chemical energy ✓**
- C. To break down glucose into simpler molecules
- D. To recycle carbon dioxide in the atmosphere

Which processes are part of cellular respiration?

- A. Glycolysis ✓**
- B. Calvin cycle
- C. Krebs cycle ✓**
- D. Electron transport chain ✓**

Describe the differences between aerobic and anaerobic respiration in terms of energy yield and by-products.

Aerobic respiration yields approximately 36-38 ATP molecules per glucose molecule and produces carbon dioxide and water as by-products. In contrast, anaerobic respiration yields only 2 ATP molecules per glucose molecule and produces by-products like lactic acid in animals or ethanol and carbon dioxide in yeast.

Which stage of cellular respiration produces the most ATP?

- A. Glycolysis

- B. Krebs cycle
- C. Electron transport chain ✓**
- D. Fermentation

Which macromolecules are primarily involved in cell membrane structure?

- A. Carbohydrates
- B. Proteins ✓**
- C. Lipids ✓**
- D. Nucleic acids

Analyze how mutations in DNA can affect protein synthesis and potentially lead to diseases.

Mutations can lead to changes in the mRNA sequence during transcription, which may result in the production of abnormal proteins during translation, ultimately causing various diseases.

What is the role of the Golgi apparatus in the cell?

- A. DNA replication
- B. Protein modification and sorting ✓**
- C. Energy production
- D. Photosynthesis

Which of the following statements about enzymes are true?

- A. Enzymes are consumed in the reactions they catalyze.
- B. Enzymes lower the activation energy of reactions. ✓**
- C. Enzymes are specific to their substrates. ✓**
- D. Enzymes can be reused multiple times. ✓**

Evaluate the impact of environmental factors on enzyme activity, providing examples of how temperature and pH can alter enzyme function.

Temperature affects enzyme activity by increasing reaction rates up to an optimal point, beyond which enzymes may denature; for example, most human enzymes function best around 37°C. Similarly, pH levels can alter enzyme shape and function, with pepsin operating optimally at a low pH in the stomach, while other enzymes like amylase function better at a neutral pH.

What is the primary role of chlorophyll in photosynthesis?

- A. Absorb carbon dioxide
- B. Absorb light energy ✓**
- C. Release oxygen
- D. Store glucose

Which of the following are stages of the Calvin cycle?

- A. Carbon fixation ✓**
- B. Reduction phase ✓**
- C. Glycolysis
- D. Regeneration of RuBP ✓**

Describe the role of ATP in cellular processes and explain how it is generated and utilized within the cell.

ATP (adenosine triphosphate) is generated mainly through cellular respiration, specifically in the mitochondria during processes like glycolysis, the Krebs cycle, and oxidative phosphorylation. It is utilized by cells to power various functions, including muscle contraction, nerve impulse propagation, and the synthesis of macromolecules.

Which type of bond holds the two strands of DNA together?

- A. Ionic bonds
- B. Covalent bonds
- C. Hydrogen bonds ✓**
- D. Peptide bonds

Which components are part of the nucleotide structure?

- A. Phosphate group ✓**
- B. Amino acid
- C. Nitrogenous base ✓**
- D. Pentose sugar ✓**

Discuss the significance of the fluid mosaic model in understanding cell membrane dynamics.

The fluid mosaic model signifies that cell membranes are composed of a phospholipid bilayer with embedded proteins that can move laterally, facilitating dynamic interactions and functions essential for cellular life.

What is the main function of the lysosome in the cell?

- A. Protein synthesis
- B. Digestion of macromolecules ✓**
- C. Energy production
- D. Photosynthesis

Which processes are involved in gene expression?

- A. Transcription ✓**
- B. Translation ✓**
- C. DNA replication
- D. RNA splicing ✓**

Explain how the principles of Mendelian genetics apply to modern genetic research and the study of hereditary diseases.

Modern genetic research applies Mendelian genetics by using the principles of segregation and independent assortment to study how traits and diseases are inherited, allowing researchers to identify genetic markers associated with hereditary diseases and develop targeted therapies.

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

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

Which of the following are functions of carbohydrates in biological systems?

- A. Energy storage ✓**
- B. Structural support ✓**
- C. Catalysis of reactions

D. Cell recognition ✓

Analyze the relationship between structure and function in enzymes, providing examples of how enzyme structure can influence its activity.

Enzyme structure directly influences its activity through the shape and properties of the active site, which determines substrate binding and catalytic efficiency. For instance, the enzyme lactase has a specific structure that allows it to effectively break down lactose, while any structural changes can lead to reduced or lost activity.

What is the main function of the nucleolus within the nucleus?

A. DNA replication

B. Ribosome production ✓

C. Lipid synthesis

D. Protein degradation