GENERAL

ap biology chapter 26 study answers

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Mastering AP Biology Chapter 26: Your Complete Study Guide and Answers

AP Biology is a rigorous course that demands a deep understanding of cellular processes, genetics, evolution, and ecology. One of the most frequently cited chapters in exam preparation is **Chapter 26: Cellular Respiration**. Whether you're a freshman tackling AP Biology for the first time or a seasoned student looking to polish your knowledge, this article offers a comprehensive review of the chapter's core concepts, practice questions, and proven study techniques. By the end of this guide, you'll have a clear roadmap to score high on the AP exam and feel confident in your mastery of cellular respiration.

What Is Chapter 26 About?

Chapter 26 is dedicated to the biochemical pathway that converts glucose into usable energy—ATP—within the cell. The chapter covers:

- Glycolysis: The first step in glucose breakdown.
- The link reaction (pyruvate oxidation).
- Citric Acid Cycle (Krebs cycle).
- Oxidative phosphorylation: Electron transport chain and chemiosmosis.
- Energy yield and efficiency.
- Regulation of respiration and its integration with photosynthesis.

Understanding these processes is essential not only for the AP exam but also for future studies in biochemistry, medicine, and environmental science.

Key Concepts and Terminology

Glycolysis

Glycolysis takes place in the cytoplasm and splits a single glucose molecule into two molecules of pyruvate, producing a net gain of 2 ATP and 2 NADH. Key enzymes include hexokinase, phosphofructokinase-1 (PFK-1), and pyruvate kinase. Remember the "investment" phase (consumes ATP) and the "payoff" phase (generates ATP).

Link Reaction

In the mitochondria, pyruvate is converted to acetyl-CoA, releasing CO , and generating NADH. This step links glycolysis to the citric acid cycle.

Citric Acid Cycle

Each turn of the cycle processes one acetyl-CoA, producing 3 NADH, 1 $FADH$,, 1 GTP (or ATP), and 2 CO ,. The cycle's intermediates are reused, making it a closed loop.

Oxidative Phosphorylation

The electron transport chain (ETC) transfers electrons from NADH and $FADH$, to oxygen, pumping protons across the inner mitochondrial membrane. The resulting proton gradient powers ATP synthase via chemiosmosis.

Energy Yield

A complete oxidation of one glucose molecule yields up to 30–32 ATP molecules, depending on the shuttle system used for NADH from glycolysis.

Study Tips for Chapter 26

1. Visualize the Pathway: Create a flowchart that links each step—glycolysis !’ link reaction !’ citric acid cycle !’ ETC. Use color coding for enzymes, intermediates, and energy carriers.
2. Memorize Key Enzymes: Flashcards work best for enzyme names and their regulatory roles (e.g., PFK-1 is allosterically regulated by ATP and AMP).
3. Understand Regulation: Know how cells regulate respiration through feedback inhibition, hormonal control, and oxygen availability.
4. Integrate with Photosynthesis: Remember that photosynthesis provides the glucose that fuels cellular respiration; they are complementary processes.
5. Practice with Multiple-Choice Questions: The AP exam emphasizes conceptual understanding, so focus on why each answer is correct or incorrect.
6. Use Mnemonics: For example, “PEST” for the order of enzymes in the citric acid cycle: Pyruvate, Acetyl-CoA, Citrate, Isocitrate, ; Ô°etoglutarate.
7. Review Past Exams: The College Board provides free past AP Biology exams. Scanning Chapter 26 questions will give you insight into question patterns.

Sample Questions and Answers

Below are ten representative multiple-choice questions that reflect the style of the AP exam. Each question is followed by the correct answer and a brief explanation.

- A) Hexokinase
- B) Phosphofructokinase-1
- C) Pyruvate kinase
- D) Aldolase

Answer: B) Phosphofructokinase-1– PFK-1 is allosterically inhibited by ATP and activated by AMP, making it the main control point.

During the citric acid cycle, which intermediate is oxidized to produce NADH?

- A) Citrate
- B) Isocitrate
- C) ; Ô°etoglutarate
- D) Succinyl-CoA

Answer: C) ; Ô°etoglutarate – ; Ô°etoglutarate dehydrogenase converts it to succinyl-CoA, producing NADH.

Which of the following best describes the link reaction?

- A) Conversion of glucose to pyruvate in the cytoplasm.
- B) Oxidation of pyruvate to acetyl-CoA in the mitochondria.
- C) Reduction of NAD z to NADH in the cytoplasm.
- D) Transport of electrons to oxygen.

Answer: B) Oxidation of pyruvate to acetyl-CoA in the mitochondria.

In a cell that uses the malate-aspartate shuttle, how many ATP are produced from one molecule of glucose?

- A) 24
- B) 28
- C) 30
- D) 32

Answer: D) 32 – The shuttle transfers cytosolic NADH into mitochondria, maximizing ATP yield.

Which of the following is a primary product of oxidative phosphorylation?

- A) CO ,
- B) NADH
- C) ATP
- D) GTP

Answer: C) ATP – The proton gradient generated drives ATP synthase.

During anaerobic respiration in muscle cells, which molecule accumulates?

- A) Lactate
- B) Pyruvate
- C) Acetyl-CoA
- D) CO ,

Answer: A) Lactate – Lactate dehydrogenase converts pyruvate to lactate, regenerating NAD z.

Which of the following best explains the regulation of the electron transport chain?

- A) Allosteric inhibition of complex I.
- B) Competitive inhibition of complex III.
- C) Feedback inhibition by ATP.
- D) Substrate-level phosphorylation.

Answer: C) Feedback inhibition by ATP. – High ATP levels signal that the chain can slow down.

Which of the following statements about the citric acid cycle is correct?

- A) It occurs in the cytoplasm.
- B) It generates 2 NADH per turn.
- C) It requires oxygen for substrate-level phosphorylation.
- D) It produces GTP, which can be used directly as ATP.

Answer: D) It produces GTP, which can be used directly as ATP.

Which of the following best describes the role of the malate dehydrogenase reaction in the citric acid cycle?

- A) It produces CO ,.
- B) It regenerates NAD z.
- C) It converts oxaloacetate to malate.
- D) It forms succinyl-CoA.

Answer: C) It converts oxaloacetate to malate.

What is the net ATP yield from one molecule of glucose in aerobic respiration using the glycerol phosphate shuttle?

- A) 24
- B) 28
- C) 30
- D) 32

Answer: C) 30 – The shuttle transfers electrons to FADH ,, slightly reducing total ATP yield.

Flashcards and Mnemonics to Reinforce Learning

- Glycolysis Steps – “HAPPY PIG” (Hexokinase, ATP, Phosphofructokinase, etc.)
- Citric Acid Cycle Enzymes – “PEST” (Pyruvate, Acetyl-CoA, Citrate, Isocitrate)
- Electron Transport Chain Complexes – “I LOVE P” (I=Complex I, L=Complex II, O=Complex III, V=Complex IV, P=Complex V)
- ATP Yield Summary – “Two to the power of three” (2 from glycolysis + 2 from Krebs + 28 from ETC)

Online Resources and Study Aids

Below are curated tools that can help you master Chapter 26:

Baca Juga (Artikel Terkait)

- **advanced engineering electromagnetics solution manual edition hardcover by balanis constantine a published by wiley**
  URL: http://djjsearch.com/advanced-engineering-electromagnetics-solution-manual-edition-hardcover-by-balanis-constantine-a-published-by-wiley.pdf
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