

Module 8: Cellular Respiration

Comprehension & Critical Thinking Questions

Part 1: Understanding Core Concepts

1. The Overview

- Write the balanced chemical equation for Cellular Respiration.
- Name the four main stages of aerobic respiration: **Glycolysis, Prep Reaction, Citric Acid (Krebs) Cycle, Electron Transport Chain.**

2. Locations

- Where in the cell does Glycolysis occur?
- Where do the Citric Acid Cycle and ETC occur? (Be specific about mitochondrial compartments).

3. The Players

- What are **chemico-osmosis** and **oxidative phosphorylation?**
- What is the role of Oxygen? Why do we die without it? (Hint: It's the "Final Electron Acceptor").

Part 2: Applying Biological Principles

1. Tracking the Math

- Start with one Glucose molecule.
- How many ATP are made in Glycolysis? (Net)
- How many ATP are made in Krebs?
- How many ATP are made in the ETC?
- Why is the "Total ATP" usually a range (30-32 or 36-38) rather than a fixed number?

2. Anaerobic Options

- If no Oxygen is available, cells switch to **Fermentation**.
- Compare **Lactic Acid Fermentation** (Humans/Bacteria) vs. **Alcohol Fermentation** (Yeast).
- Does fermentation produce any *new* ATP? If not, why do cells do it? (Hint: Regenerating NAD⁺).

Part 3: Analyzing & Evaluating

1. Efficiency Analysis

- Automobiles are about 25% efficient (converting gas to movement). Cellular respiration is about 34% efficient. Where does the rest of the energy go? (Refer back to thermodynamics/body heat).

2. Metabolic Crossroads

- We don't just eat sugar. Explain how proteins and fats enter the cellular respiration pathway. Where do fats enter? Where do amino acids enter? (Deamination).