

Unit 2 Review Metabolic Processes

CELLULAR RESPIRATION:

Section 3.1: Metabolism and Energy

- What is the difference between a catabolic and anabolic reaction?
- Draw a reaction profile for an exergonic and endergonic reaction. On the same reaction profile, draw the resulting effect that an enzyme would have on both reactions.

Section 3.2: Aerobic Respiration

- What are the 4 main processes that occur during cellular respiration? Where do each of these processes occur in the mitochondria?
- What are the net products that are made during each of these processes? Focus specifically on the net production of ATP, NADH & FADH₂
- Glycolysis:
 - What happens to the glucose molecule at the end of this process?
 - How many ATP molecules were used and how many were created?
 - How many NADH molecules were reduced?
- Pyruvate oxidation:
 - Where does it occur in the mitochondria?
 - Is ATP or NADH created or used?
 - What is the final product of this process and why is it required?
- Krebs Cycle:
 - How many ATP molecules are used/created during this process?
 - How many NADH and FADH molecules are reduced during this process?
 - What molecule binds to Acetyl-CoA at the beginning of the Krebs Cycle?
 - Why are NADH and FADH important molecules in the process of cellular respiration?
- Oxidative Phosphorylation (i.e. Electron Transport Chain):
 - How many ATP are created during this process?
 - Explain the process of chemiosmosis and how it helps to create ATP.
 - NADH and FADH donate their electrons to which complex in the ETC?
 - How is the electrochemical gradient created?
 - Where is the electrochemical gradient created in the mitochondria?
 - Which molecule is the final electron acceptor?
 - What protein complex is responsible for the production of ATP? Explain how this protein complex functions?
 - How many ATP molecules do NADH and FADH₂ yield?

Section 3.3: Anaerobic Respiration

- What is anaerobic respiration and how does it differ from aerobic respiration?
- What is the difference between lactate and ethanol fermentation?
- How many ATP and NADH molecules are produced during anaerobic respiration?

PHOTOSYNTHESIS :

Section 4.1: Light-Dependent Reactions

- Explain the main differences between light-dependent and light independent reactions? (purpose, products etc)
- In the light-dependent reaction, photosystems are required to capture the light and excite electrons. What are the components of a photosystem? How do these components enable sunlight to be captured and photoexcitation to occur?
- The process of photophosphorylation enables H⁺ to be pumped across the thylakoid membrane to create an electrochemical gradient so that chemiosmosis can occur. Which protein complex in the ETC enable H⁺ to be pumped across the membrane?
- What is the role of oxygen in the ETC of photosynthesis?
- What molecule is the final electron acceptor in the ETC?

Section 4.2 : Light-Independent Reactions

- What molecule must bind to CO₂ in order to initiate the Calvin Cycle?
- Why is G3P an important intermediate molecule?
- Why is NADPH required for the Calvin Cycle?
- How many ATP molecules are used for 6 molecules of CO₂?
- How are cellular respiration and photosynthesis interconnected to one another?
- Compare and contrast the ETC of cellular respiration and photosynthesis.

*****For further practice answering Thinking/Inquiry and Application questions, consult the questions at the end of each chapter in the textbook.***