

## CHAPTER 9 CELLULAR RESPIRATION: HARVESTING CHEMICAL ENERGY

### Learning objectives:

#### The Principles of Energy Harvest

1. In general terms, distinguish between fermentation and aerobic respiration.
2. Define oxidation and reduction. Be able to identify oxidizing agents and reducing agents, as well as identify which molecules are being oxidized/reduced in an equation.
3. Explain in general terms how redox reactions are involved in energy exchanges.
4. Describe the structure and the role of  $\text{NAD}^+$  in cellular respiration.
5. In general terms, explain the role of the electron transport chain in cellular respiration.

#### The Process of Cellular Respiration

6. Name the three stages of cellular respiration and state the region of the eukaryotic cell where each stage occurs. State the net amount of ATP generated by each stage and the type of phosphorylation that occurs. Be able to label or draw a representation of cellular respiration in a eukaryotic cell.
7. Describe how the carbon skeleton of glucose changes as it proceeds through glycolysis (comparing glucose and pyruvate).
8. What is the energy yield of the citric acid cycle.
9. Distinguish between substrate level phosphorylation and oxidative phosphorylation.
10. In general terms, explain how the exergonic “slide” of electrons down the electron transport chain is coupled to the endergonic production of ATP by chemiosmosis.
11. Explain where and how the electron transport chain creates a proton gradient.

#### Related Metabolic Processes

12. Distinguish between fermentation and anaerobic respiration.
13. State the basic function of fermentation.
14. Compare the fate of pyruvate in alcohol fermentation and lactic acid fermentation.
15. Describe how food molecules other than glucose can be oxidized to make ATP.
16. Explain how we regulate catabolic pathways