

CHAPTER 9 – LEARNING OBJECTIVES

After completing this chapter, the successful student will be able to:

1. Understand how sunlight is tied to providing energy in our cells.
2. Discuss why organic molecules (such as glucose) contain potential energy.
3. Briefly describe the difference between aerobic and anaerobic respiration and its effect on ATP production in a cell.
4. Discuss oxidation-reduction (redox) reactions.
5. Point out which molecules are reduced during cellular respiration.
6. Point out which molecules are oxidized during cellular respiration.
7. Write out the balanced equation for cellular respiration.
8. Describe the role hydrogens play in moving electrons during cellular respiration.
9. Discuss the role dehydrogenases play in cellular respiration.
10. Discuss the role NAD^+ and FAD^+ play in cellular respiration.
11. State what is the final electron acceptor in cellular respiration.
12. Discuss the difference between sending electrons down a staircase (Electron Transport Chain) to reach the final electron acceptor versus moving them directly from glucose to the final electron acceptor.)
13. Compare and contrast substrate level phosphorylation and oxidative phosphorylation.
14. Discuss in detail each of the following components of cellular respiration: Glycolysis, Pyruvate Processing, Citric Acid Cycle, and Oxidative Phosphorylation. You should include the following for each process:
 - a. Where in the cell it takes place
 - b. Which molecules begin each process and which molecules leave
 - c. How many ATPs are made by substrate level phosphorylation
 - d. How many NADH are made
 - e. How many FADH_2 are made
 - f. How many CO_2 are produced
 - g. How many ATPs are made by oxidative phosphorylation
15. List the steps and enzymes of glycolysis, including where ATP is invested, ATP is made, and NADH is made
16. Understand that an energy investment is needed to get glycolysis started.
17. Understand the role Coenzyme A plays in pyruvate processing and the citric acid cycle.
18. List the steps of the citric acid cycle, including where ATP is made, NADH is made, FADH_2 is made, and CO_2 is released.
19. Know how many carbons each molecule within the citric acid cycle has.
20. Describe in detail how electrons from NADH and FADH_2 are used to produce ATP during oxidative phosphorylation.
21. Discuss which process occurs after glycolysis in cells if no oxygen is available.
22. State how many ATP are gained during anaerobic respiration
23. State how many ATP are gained during fermentation
24. Discuss why fermentation allows glycolysis to continue
25. Compare and contrast the two types of fermentation.
26. Understand and be able to describe how other organic molecules (carbs, fats, proteins) enter cellular respiration.
27. Briefly describe the role feedback plays in cellular respiration.