**Cell Energetics Study Questions**

Chapter 9

*Suggested Bozeman Videos: Bioenergetics, Photosynthesis & Respiration*

Section 9.1

1. How many kilocalories of energy per mole of glucose are released when glucose is fully oxidized to CO2 and H2O?
2. What molecule is the “energy currency” of cells?
3. What three metabolic processes harvest the energy in the chemical bonds of glucose?
4. True or False. Glycolysis begins glucose metabolism in all cells.
5. Why is glycolysis an anaerobic process?
6. Why is cellular respiration an aerobic process?
7. Is fermentation aerobic or anaerobic?

Section 9.2

1. Where does glycolysis take place in a cell?
2. What are the products of glycolysis?
3. True or false. The cell actually invests two molecules of ATP into glycolysis in order to produce 4 molecules of ATP. A net gain of 2 ATP molecules.
4. What is “substrate-level phosphorylation”?
5. How does the poison arsenic work?
6. Where does the Krebs Cycle/Citric acid cycle take place?
7. What does the Krebs Cycle/Citric acid cycle produce?

Section 9.3

1. What is electron transport?
2. What is chemiosmosis?
3. What does ATP synthase do?
4. The electron transport chain ultimately reduces oxygen to what molecule?
5. Where is the electron transport chain located?
6. Every day a person uses about how many molecules of ATP?

Section 9.4

1. Where do fermentation pathways occur?
2. Fermentation is important to regenerate what molecule that is necessary for glycolysis?
3. What are the two best understood fermentation pathways?
4. By recycling NAD+, fermentation allow what process to continue?
5. What were two key events in the evolution of complex, multicellular organisms?

Chapter 8

*Suggested Bozeman Videos: Life Requires Free Energy, Gibbs Free Energy*

Section 8.1

1. All living things must obtain energy from where?
2. All forms of energy can be considered as one of two basic types. What are the two types?
3. Define metabolism.
4. What are anabolic reactions?
5. What are catabolic reactions?
6. What does it mean that catabolic and anabolic reactions are often linked?
7. What is the 1st Law of Thermodynamics?
8. What is the 2nd Law of Thermodynamics?
9. Describe the relationship of free energy (G), enthalpy (H), and entropy (S).
10. What does the 2nd Law say about disorder?
11. What’s the difference between exergonic and endergonic reactions? Catabolic tend to be which type? Anabolic tend to be which type?

Section 8.2

1. Why do cells rely on ATP?
2. What is the structure of ATP?
3. How much energy is released when ATP splits into ADP + P?
4. What does it mean that ATP participates in an “energy-coupling cycle”?
5. Look at the example in Figure 8.7. Do you understand how the splitting of ATP can drive the formation of Glucose 6-phosphate? In a similar manner, ATP can drive the formation of many other biological molecules as well. It can also drive protein shape changes for active transport and movement.

Chapter 47

*Suggested Bozeman Video: Information Processing*

1. Briefly describe the functions of the following brain regions:
2. Limbic system
3. Amygdala
4. Hippocampus
5. The four lobes of the brain: temporal lobe, frontal lobe, parietal lobe, and occipital lobe.