**HONORS BIOLOGY 2022-2023/ZEDALIS/THE BISHOP’S SCHOOL**

**OPENSTAX READING ASSIGNMENTS**

**THE STUDY OF LIFE**

Chapter 1: The Study of Life

ANSWER:

1. Create a diagram to **describe** the hierarchical organization of the biological world.
2. **Describe** the characteristics that define life.
3. How do viruses fit into our definitions of living systems?

**CHEMISTRY**

Chapter 2: The Chemical Foundation of Life

ANSWER:

1. **Explain** how molecules can be built from atoms by covalent bonds.
2. **Contrast** polar and nonpolar covalent bonds.
3. **Explain** how the structure of water leads to hydrogen bond formation and water’s cohesive and adhesive properties.
4. **Define** acids, bases, and the pH scale.

**BIOCHEMISTRY**

Chapter 3: Biological Macromolecules

ANSWER:

1. **Describe** the relationship between organic functional groups and macromolecules.
2. What is the relationship between dehydration synthesis and hydrolysis?
3. Relate the structure of polysaccharides to their functions.
4. **Describe** the relationship between amino acid sequence and the three-dimensional structure of the tertiary level of protein structure.
5. **Identify** two environmental conditions that can alter protein structure.
6. Why do phospholipids form membranes while triglycerides for insoluble droplets?

**CELLS**

Chapter 4: Cell Structure

ANSWER:

1. **Describe** the factors that limit cell size.
2. **Explain** the probable origin of mitochondria and chloroplasts.
3. Until recently, all types of prokaryotic cells were lumped together. Why is it more accurate to distinguish archaea from bacteria?

**CELL MEMBRANE STRUCTURE AND FUNCTION**

Chapter 5: Structure and Function of Plasma Membrane

ANSWER:

1. **Explain** how membranes form spontaneously from phospholipids.
2. **Describe** the functions of membrane proteins.
3. Why are transmembrane proteins hydrophobic?
4. **Describe** the following processes of transport of materials across membranes: simple diffusion, facilitated diffusion, osmosis, and active transport.
5. If you require intravenous (IV) medication in the hospital, what should the concentration of solutes in the IV solution be relative to your blood cells?

**ENERGY AND ENZYMES**

Chapter 6: Metabolism

ANSWER:

1. **Contrast** oxidation and reduction reactions.
2. **Contrast** the course of a chemical reaction with and without an enzyme catalyst.
3. Enzyme activity must be regulated. **Describe** the difference between competitive and non-competitive inhibition. What environmental factors affect enzyme activity?
4. Phosphofructokinase functions to add a phosphate group to a molecule of fructose-6-phsophate. This enzyme functions early in glycolysis, and energy-yield biochemical pathway in cellular respiration (Chapter 7). The enzyme has an active site that binds fructose and ATP. An allosteric inhibitory site also binds ATP when cellular levels of ATP are very high.
5. Predict the rate of the reaction if the levels of cellular ATP are low.
6. Predict the rate of the reaction if levels of cellular ATP are very high.
7. Describe what is happening to the enzyme when levels of ATP are very high.

**CELLULAR RESPIRATION**

Chapter 7: Cellular Respiration

ANSWER:

1. Explain the role of electron carriers such as NAD+ in energy metabolism.
2. Contrast the two fundamentally different mechanisms how cells make ATP.
3. Describe the process of glycolysis and its energy yield.
4. What are the energy yields of the Kreb’s cycle per molecule of glucose under aerobic conditions?
5. Create a diagram that shows how the establishment of a proton gradient connects electron transport with ATP synthesis.

**PHOTOSYNTHESIS**

Chapter 8: Photosynthesis

ANSWER:

1. Differentiate between the light-dependent and the light-independent reactions of photosynthesis.
2. Why did Lynn Margulis, who is credited with the Endosymbiont Hypothesis, remark that a mutation in bacteria that allowed them to absorb light at P680 in photosystem II altered the course of evolution on Earth? In other words, what key event occurs in photosystem II that does not occurs in photosystem I?
3. If the thylakoid membrane was leaky to protons, would ATP still be produced? Would NADPH?
4. Why is the Calvin Cycle often called the carbon fixation cycle? How does the Calvin Cycle compare with glycolysis?