**Biochemistry Possible Free Response Questions**

You will see one or more of these FRQ/Essay questions on your first AP Biology exam which will take place the second week of school. On the day of the exam, a former AP Biology student will come in and pick a number(s) out of my Boston Red Sox helmet. The number(s) chosen will be the free response question(s) written for that exam so plan accordingly.

**“If you fail to plan…plan to fail.”**

**1.** The unique properties of water make life on Earth possible. Select three properties of water and for each property:

 **a)** **identify** and **define** the property and **explain** it in terms of the chemical/physical nature of water.

 **b)** **describe** how water affects the functioning of living organisms by **explaining** each of the

 following:

 **(i)** the ability of water to moderate temperature within living organisms and in organisms’

 environments.

 **(ii)** the movement of water from the roots up and out the leaves of plants .

 **(iii)** the role of water as a medium for the metabolic processes of cells.

**2.** All life on Earth is carbon based. Our carbon basis allows for the formation of complex molecules.

 **a)** Atomically speaking, what allows the element carbon to be the backbone of many large, complex macromolecules such as carbohydrates, fats/lipids, proteins and nucleic acids.

 **b)** For each of the four groups of complex carbon based molecules (*macromolecules*) mentioned

 above:

 **(i)** **discuss** the structural components of the macromolecule.

 **(ii)** **discuss** two examples of molecules that belong to each of the groups that you chose and

 briefly **describe** their function.

 **c)** All of these groups of macromolecules are created from *monomers* joining to form *polymers*.

 **Describe** and **explain** the chemical reactions that create and break down these molecules.

**3.** Proteins – large complex molecules – are major building blocks of all living organisms.

 **Discuss** each of the following in relation to proteins:

 **a)** their chemical composition

 **b)** levels of structure of proteins with a specific example of each.

 **c)** the roles of DNA, mRNA and tRNA in protein synthesis.

 **d)** the roles of proteins in membrane structure and transport of molecules across the membrane.

**4. a)** **List** and briefly **describe** the conditions on early Earth that made the origin on life possible.

 **b)** **Describe** the Miller-Urey experiment and the contributions it made in developing a model for the abiotic synthesis of organic molecules.