***Unit 1 - Possible Free Response Questions***

You will see one or more of these 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.

**“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 process that joins 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.** Most enzymes are globular and therefore tertiary in structure.

**a)** **Describe** the tertiary structure of proteins being sure to include the interactions between the side

chains that contribute to its overall shape.

**b)** Explain how the tertiary structure of an enzyme allows it to perform its function.

**c) Compare** and **contrast** the effects of competitive and noncompetitive inhibition on enzyme action

by explaining how each affects enzyme structure.

**5. 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.