***Possible Biochemistry Free Response***

You will see one or more of these questions on your first AP Biology exam. On the day of the exam, a former AP Biology student will come in and pick the number(s) between 1 and 5 out a hat. The number(s) chosen will be the free response 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.

 **b)** Pick three of the four groups of complex carbon based molecules (*macromolecules*) and for each:

 **(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)** the chemical composition and levels of structure of proteins with a specific example of each.

 **b)** the roles of DNA and RNA in protein synthesis.

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

**4.** **a)** What are enzymes and how EXACTLY do they affect chemical reactions. **Draw** and **label** an

 “idealized” graph to help you **explain** the difference between a catalyzed chemical reaction and a

 noncatalyzed chemical reaction.

 **b)** **Draw** an “idealized” graph for each of the following to assist you in **explaining** the relationship each

 of the following factors have on enzyme activity.

 **(i)** temperature

 **(ii)** pH

 **(iii)** [substrate]

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

**5.** **Graph**, **Calculate** and **Compare** the rates of enzyme catalyzed reactions.