Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_

**Unit 2 Biochemistry Review Packet***.*

**Topic #1: Atomic and Molecular Structure**

1. ***Vocab:*** define the following terms in your own words.

|  |  |
| --- | --- |
| a) Atomb) Elementc) Compoundd) Isotopee) Atomic Mass, f) Atomic Number | g) Protonh) Neutroni) Electronj) Ionic Bondk) Covalent Bond |

1. Which six elements are most common in living cells?
2. What type of ion (positive or negative) forms when an atom LOSES electrons?
3. Use your periodic table to locate Helium (He). Fill in the following chart based on the information.

|  |  |
| --- | --- |
| Atomic Number |  |
| Atomic Mass |  |
| # of Protons |  |
| # of Neutrons |  |
| # of Electrons |  |

**Topic #2: Properties of Water**

1. What is the meaning of the following statement: water is a polar molecule?
2. Describe how the polarity of a water molecule allows it to form hydrogen bonds with other water molecules. Draw a picture of hydrogen bonding between water molecules.
3. Describe an example of a solution. Identify the solute and solvent in your example solution.
4. Explain how water’s polarity results in its ability to act as a solvent.
5. Explain how water’s ability to form hydrogen bonds causes the following properties of water:

|  |  |
| --- | --- |
| a) Cohesionb) Adhesionc) Capillary Action | d) Surface Tensione) Low Density as a Solidf) High Heat Capacity / Specific Heat |

1. What is the pH of pure water? How does this compare to the pH of acids and bases? What are some examples of acids and bases (two examples for each)?

**Topic #3: Macromolecules**

1. Why do we call the four types of macromolecules (carbohydrates, lipids, proteins, and nucleic acids) organic compounds?
2. Explain the difference between dehydration synthesis and hydrolysis.
3. Explain the difference between monomers and polymers.
4. Identify the monomers and polymers for the following types of macromolecules: Carbohydrates, Lipids, Proteins, Nucleic Acids *(You should also be familiar with the names and functions of the example molecules we discussed in class…for example, glycogen is an example of a polysaccharide and it is used as an energy storage molecule in animals)*

|  |  |  |
| --- | --- | --- |
| **Macromolecule** | **Monomer** | **Polymer** |
| Carbohydrate |  |  |
| Lipid |  |  |
| Protein |  |  |
| Nucleic Acid |  |  |

1. List the functions for the following types of macromolecules: Carbohydrates, Lipids, Proteins, and Nucleic Acids

|  |  |
| --- | --- |
| **Macromolecule** | **Function** |
| Carbohydrate |  |
| Lipid |  |
| Protein |  |
| Nucleic Acid |  |

1. How can protein molecules have so many potential functions? What is it about their structure that makes this possible?
2. What happens to a protein molecule if there is a drastic change in pH or temperature?

**Topic #4: Enzymes**

1. Draw an enzyme-catalyzed reaction (in other words, a reaction that is sped up by an enzyme), making sure to label the substrate (AKA reactant), enzyme, active site, enzyme-substrate complex, and products.
2. What is the activation energy of a reaction? How does an enzyme affect the activation energy of a reaction? How does this change the speed of the reaction?
3. Explain the lock and key model of enzyme-substrate interaction.
4. What happens to the efficiency of the enzyme if there is a slight increase in temperature (not past the optimum temperature)?
5. What happens to the efficiency of the enzyme if there is a major increase in temperature (past the optimum temperature) or a major fluctuation in pH (either above or below the optimum pH)? Why does this change in efficiency take place?
6. What happens to the rate of an enzyme-catalyzed reaction if there is an increase in the number of enzyme or substrate particles?