Biochemistry Review

Name _____

Period ____ Date _____

Vocabulary				
Biochemistry Organic compound Inorganic compound Monomer Polymer	Macromolecule Hydrophilic Hydrophobic Carbohydrate Lipid	Protein Nucleic acid Monosaccharide Disaccharide Polysaccharide	Fatty acid Polar Nonpolar Saturated fat Unsaturated fat	Phospholipid Steroid Amino acids Nucleotides Enzymes

Carbon:

1. What is the **biology**? What is **biochemistry**?
   Biology: the study of living organisms
   Biochemistry: the chemical characteristics and reactions of a particular living organism of biological substance

2. Nearly all organic compounds are composed of which chemical element? **CARBON**

3. How many subatomic particles are contained in one carbon atom?

   Protons? **6** Neutrons? **6** Electrons? **6**

4. A carbon atom has how many valence electrons? **4**

   How many bonds is a carbon atom able to form? **4**

5. *Circle one:*
   What type of bond will carbon form with most other molecules? IONIC **COVALENT**

Water:

6. At what angle are the 2 hydrogen atoms of a water molecule bonded to the oxygen atom? **105°**

7. *Circle one:*
   The 2 hydrogen and 1 oxygen molecules are bonded through which type of bond? IONIC **COVALENT**

8. In a water molecule, the oxygen carries a partial **NEG** charge and the hydrogens carry a partial **POS** charge.

9. Water has a high surface tension. What is meant by this statement? Reference **cohesion** in your answer.
   Due to the cohesive forces of water (water molecules "stick" to other water molecules"), at the surface layer, water molecules are able to stick together due to the attractive forces between the molecules.

10. Water is often called a **universal solvent**. Why is water considered a universal solvent?

Due to its polarity, water is able to dissolve a vast amount of chemical compounds, rendering it a "universal" solvent.

Biochemistry

11. Compare and contrast the terms **monomer** and **polymer**.

Monomer: the building blocks of more complex molecules; the single-molecule unit in a polymer

Polymer: a natural or synthetic macromolecule comprised of many repeating units of a smaller molecule

Monomers make up polymers; polymers are made of monomers

12. Compare and contrast the terms **hydrophilic** and **hydrophobic**.

Hydrophilic: water loving

Hydrophobic: water fearing

both are terms to describe a molecule's interactions with water

Carbohydrates

13. What is the monomer of carbohydrates? **MONOSACCHARIDES**

14. List one example of each of the following carbohydrates:

Monosaccharide **GLUCOSE**

Disaccharide **LACTOSE**

Polysaccharide **CELLULOSE**

15. Carbohydrates are composed of which chemical elements? **CARBON, HYDROGEN, OXYGEN**

Lipids:

16. What is the monomer of lipids? **FATTY ACIDS**

17. Lipids are composed of which chemical elements? **CARBON, HYDROGEN, OXYGEN**

18. Identify the **glycerol head** and **hydrocarbon tail** of the fatty acid diagram.

19. What are the physical properties of the glycerol head of a fatty acid?

Polar and hydrophilic

20. What are the physical properties of the hydrocarbon tail of a fatty acid?

Nonpolar and hydrophobic

21. What are the 4 parts of a **triglyceride**?

1 glycerol head
3 hydrocarbon tails

22. Compare and contrast **saturated fats** and **unsaturated fats**.

Saturated fats: a type of triglyceride; have straight hydrocarbon tails; solid at room temperature
Unsaturated fats: a type of triglyceride; have kinked hydrocarbon tails; liquid at room temperature

23. What are the physical properties of phospholipids that allow these molecules to form our cell membranes? Reference the structure of a phospholipid in your answer.

Glycerol head is polar and hydrophilic so it orients itself TOWARDS water. Two hydrocarbon tails are nonpolar and hydrophobic so they orient themselves AWAY from water. When many phospholipids are together they will form a double layer so that the tails are away from water and the heads are touching water.

24. How does the structure of a **steroid** differ from the structure of a fatty acid?

Steroids are NOT composed of fatty acids; they are composed of 4 fused carbon rings with varying functional groups attached

Proteins

25. What is the monomer of proteins? **AMINO ACIDS**

26. Proteins are composed of which chemical elements? **CARBON, HYDROGEN, OXYGEN, NITROGEN**

27. List 3 things that are made of proteins: **SKIN CELLS, MUSCLE CELLS, ENZYMES**

28. What are the four parts of an amino acid (bonded to the central carbon atom)?

AMINO GROUP **CARBOXYL GROUP**

SINGLE HYDROGEN **R GROUP**

29. How many amino acids are found in nature? **20**

30. Amino acids bond through which type of bond? **PEPTIDE BONDS**

31. What is the function of **enzymes**?

Enzymes increase the rate of a chemical reaction and regulate chemical processes; they lower the energy needed to start a chemical reaction

Nucleic Acids

32. What is the monomer of nucleic acids? **NUCLEOTIDES**

33. What are the 3 parts of the monomer of nucleic acids?

PHOSPHATE GROUP **PENTOSE SUGAR** **NITROGENOUS BASE**

34. What two types of bonds do nucleic acids utilize to bond to form our DNA?

COVALENT BONDS **HYDROGEN BONDS**

Classify:

Classify each of the following as: ***carbohydrate (C), proteins (P), or lipids (L).*** *Write the letter of the macromolecule on the line provided.*

35. Starch C
36. Cholesterol L
37. Steroid L
38. Glycogen C
39. Enzyme P
40. Saturated Fat L
41. Polypeptide chain P
42. Glucose C
43. Polysaccharide C
44. Phospholipid L
45. Monosaccharide C
46. Cellulose C
47. Amino acid P
48. Unsaturated Fat L

Identify the specific macromolecule associated with each statement. Choose from: ***carbohydrates (C), proteins (P), or lipids (L).*** *Write the letter of the macromolecule on the line provided.*

49. P provides long term energy storage for animals
50. C provides immediate energy
51. L forms the cell membrane of all cells
52. P speeds up chemical reactions by lowering activation energy
53. C provides structural support for plants

Using the terms ***monosaccharide (M), polysaccharide (PS), lipid (L), or protein (P),*** *identify which food molecule you would eat if… (write the letter of the macromolecule on the line)*

54. ...you need a quick boost of energy M
55. ...you want to grow strong nails P
56. ...you had a race tomorrow afternoon PS/P
57. ...you were getting ready for hibernation L
58. ...you wanted to build bigger muscles P
59. ...your next meal will be in a week L
60. ...you wanted to grow healthy hair P

****OTHER STUDY TOOLS**: notes, Monomer & Polymer Worksheet, Macromolecule Lab packet (paper molecules), warm up questions, Quizlet flashcards (Miss R's website)