Macromolecules Review Worksheet for H Biology

Part A. *Classify each as a carbohydrate, protein, or lipid.*

1. carbohydrate_____	Starch	9. carbohydrate_____	Polysaccharide
2. lipid_____	Cholesterol	10. lipid_____	Phospholipid
3. lipid_____	Steroid	11. neither, but is a key component of a lipid____	Glycerol
4. carbohydrate_____	Glycogen	12. carbohydrate_____	Monosaccharide
5. protein_____	enzyme	13. carbohydrate_____	Cellulose
6. lipid_____	saturated fat	14. protein_____	amino acid
7. protein_____	polypeptide chain	15. lipid_____	unsaturated fatty acid
8. carbohydrate_____	Glucose		

Part B. *Identify the specific molecule (use the above terms) from each description. Some terms may be used more than once.*

16. lipids_____ provides long-term energy storage for animals
17. carbohydrate_____ provides immediate energy
18. lipids_____ sex hormones
19. carbohydrate_____ provides short-term energy storage for plants
20. protein_____ animal and plant structures
21. lipids_____ forms the cell membrane of all cells
22. protein_____ speeds up chemical reactions by lowering activation energy
23. carbohydrate_____ one sugar
24. protein (amino acids)_____ monomer of proteins
25. carbohydrate_____ provides long-term energy storage for plants
26. lipids_____ steroid that makes up part of the cell membranes
27. *glycerol (see above)_____ 3-carbon "backbone" of a fat
28. carbohydrate_____ provides short-term energy storage for animals
29. carbohydrate_____ many sugars
30. carbohydrate_____ forms the cell wall of plant cells

Part C. *Which specific molecule (saturated fat, unsaturated fat, protein, glucose, starch, cellulose) is each food mostly made of?*

31. starch_____	almond	39. cellulose_____	celery
32. cellulose_____	spinach	40. starch_____	soy beans
33. protein_____	beef jerky	41. glucose_____	cranberries

34. protein_____ bacon

35. starch_____ noodles

36. glucose_____ orange juice

37. protein/saturated fat__ cheese

38. starch_____ wheat

42. protein_____ egg white

43. glucose_____ table sugar

44. starch_____ popcorn

45. protein_____ lobster

46. unsaturated fat_____ sesame oil

Part D. *State whether each is found in animals, plants or both.*

47. animals_____ saturated fat

48. both_____ protein

49. both_____ steroid

50. both_____ amino acid

51. both_____ monosaccharide

52. plants_____ cellulose

53. both_____ glucose

54. both_____ enzyme

55. both_____ polysaccharide

56. animals_____ glycogen

57. plants_____ starch

58. both_____ phospholipid

Part E. *Which food molecule (monosaccharide, polysaccharide, lipid, protein) would you eat if…*

68. …you needed a quick boost of energy? monosaccharide_____

69. …you wanted to grow strong nails? protein_____

70. …you haven't eaten in days? protein_____

71. …you wanted to grow healthy hair? protein_____

72. …you had a race tomorrow afternoon? polysaccharide_____

73. …you were getting ready for hibernation? lipid_____

74. …you wanted to get bigger muscles? protein_____

75. …your next meal will be in a week? lipid_____

Short Answer questions

1. What is the relationship between glucose, fructose, and galactose?

   They are isomers of one another – They have the same chemical formula but differ in how those elements are bonded to each other within the molecule.

2. What are the structural differences between a saturated and an unsaturated fat?

   Unsaturated fats have a double bond between at least two carbons in the fatty acid tail and those same carbons have only a single hydrogen bonded to each.

3. Explain how polymers are related to monomers.

   Polymers are comprised of monomers.

A short primer on bonding…

Most living things are mainly composed of different combinations of the same five elements. These elements are carbon, oxygen, hydrogen, nitrogen and phosphorus (mainly found in nucleic acids – which is not a focus for this test). Carbohydrates and fats are comprised of carbon, hydrogen and oxygen. Proteins are composed of a chain of amino acids. Amino acids are made of a central carbon bonded to 4 different groups: a carboxyl group (–COOH), an amine group (–NH2), a hydrogen atom (–H), and a side group that varies depending on the type of amino acid. Twenty common amino acids can combine in various ways to make different protein molecules. The sequence of amino acids in each protein is unique to that protein, so each protein has its own unique 3-D shape.

Why do these particular elements bond together to form organic molecules? What is unique to carbon that makes it the most important element in organic molecules? As you have learned, it is the number of valence electrons that allow certain elements to bond with one another. What do you think the mnemonic device "HONC 1-2-3-4" might mean?

If carbon has __4____ valence electrons, then it can form ___4_____ bond(s).
If hydrogen has___1___ valence electrons, then it can form ___1_____ bond(s).
If oxygen has___6___ valence electrons, then it can form ____2_____ bond(s).
If nitrogen has__5____ valence electrons, then it can form ____3_____ bond(s).