**Macromolecules Review Worksheet for Anatomy and Physiology**

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

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | Starch | 9. | Polysaccharide |
| 2. | Cholesterol | 10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Phospholipid |
| 3. | Steroid | 11. | Glycerol |
| 4. | Glycogen | 12. | Monosaccharide |
| 5. | enzyme | 13. | Cellulose |
| 6. | saturated fat | 14. | amino acid |
| 7. | polypeptide chain | 15. | unsaturated fatty acid |
| 8. | Glucose |  |  |

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

16.\_\_\_ provides long-term energy storage for animals

17. provides immediate energy

18. sex hormones

19. provides short-term energy storage for plants

20. animal and plant structures

21.\_ forms the cell membrane of all cells

22. speeds up chemical reactions by lowering activation energy

23. one sugar

24. monomer of proteins

25. provides long-term energy storage for plants

26.\_ steroid that makes up part of the cell membranes

27. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3-carbon “backbone” of a fat

28. provides short-term energy storage for animals

29. many sugars

30. 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. | almond | 39. | celery |
| 32. | spinach | 40. | soy beans |
| 33. | beef jerky | 41. | cranberries |
| 34. | bacon | 42. | egg white |
| 35. | noodles | 43. | table sugar |
| 36. | orange juice | 44. | popcorn |
| 37. | cheese | 45. | lobster |
| 38. | wheat | 46. | sesame oil |

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

|  |  |  |  |
| --- | --- | --- | --- |
| 47. | saturated fat | 53. | glucose |
| 48. | protein | 54. | enzyme |
| 49. | steroid | 55. | polysaccharide |
| 50. | amino acid | 56. | glycogen |
| 51. | monosaccharide | 57. | starch |
| 52. | cellulose | 58. | phospholipid |
|  |  |  |  |

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

68. …you needed a quick boost of energy?

69. …you wanted to grow strong nails?

70. …you haven’t eaten in days?

71. …you wanted to grow healthy hair?

72. …you had a race tomorrow afternoon?

73. …you were getting ready for hibernation?

74. …you wanted to get bigger muscles?

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

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).