

**Biology 12 - Biologically Important Molecules – Review Worksheet**

- **Part A: Mix and Match:** Match the term on the right with the definition on the left. Each term can be used only once. Write the letter of the best answer in the box to the left of the definition. (1/4 mark each -- total of 10 marks for this section)

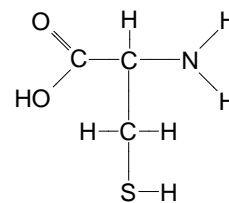
1)	water-"loving"	A)	adenosine triphosphate
2)	water-"fearing"	B)	amino acid
3)	two or more polypeptide chains coming together and bonding with each other	C)	atom
4)	to permanently change the 3 dimensional structure of a protein	D)	buffer
5)	the subunit that makes up nucleic acids - 4 types in DNA are A C G T	E)	carbohydrate
6)	the smallest unit of matter that cannot normally be broken into smaller particles	F)	cellulose
7)	the process of breaking down large fat droplets into smaller fat droplets	G)	cholesterol
8)	the loose association of amino acids in a polypeptide chain with each other, usually through H-bonds. e.g. alpha helix, beta pleated sheet	H)	dehydration synthesis
9)	the linear sequence of amino acids in a protein, which ultimately determines its shape	I)	denature
10)	the building block of protein -- there are 20 different kinds normally found in nature	J)	emulsification
11)	the bond that forms between two amino acids joined by dehydration synthesis	K)	enzymes
12)	the 3-D shape of a polypeptide chain due to it folding back on itself and forming bonds.	L)	glucose
13)	molecules with identical empirical formulas but different structural arrangements of atoms	M)	glycogen
14)	elements with identical atomic numbers, but different number of neutrons	N)	hydrogen bond
15)	creating a bond between two atoms by taking OH from one atom and H from the other	O)	hydrolysis
16)	breaking a bond between two atoms by adding OH to one atom and H to the other	P)	hydrophobic
17)	biological catalysts, composed of protein, that speed up chemical reactions	Q)	hydrophilic
18)	ATP - the molecule that carries energy in the cell	R)	ion
19)	any molecule with the molecular formula $C_n(H_2O)_n$	S)	isomers
20)	an important component of cell membranes, has a hydrophilic head, hydrophobic tail	T)	isotopes
21)	an enzyme that breaks down maltose to two glucose molecules	U)	lipid
22)	an atom or molecule that has either lost or gained electrons	V)	maltase
23)	a weak bond due to the attraction between partial charges on hydrogen, oxygen, and nitrogen atoms	W)	maltose

24)	a polymer of glucose, used as a structural component of plant cell walls	X)	neutral fat
25)	a polymer of glucose, used as a storage form for glucose in animals	Y)	nucleotide
26)	a polymer of glucose, used as a storage form for glucose in plants	Z)	oxidation
27)	a loss of Hydrogen atoms (or electrons)	AA)	peptide bond
28)	a lipid that is an important component of cell membranes and from which steroid hormones are made	BB)	phospholipid
29)	a lipid composed of glycerol joined to 3 fatty acids	CC)	polymer
30)	a large organic molecule formed from a chain or chains of amino acids	DD)	primary structure
31)	a large molecule made by joining together smaller identical (or similar) molecules	EE)	protein
32)	a gain of Hydrogen atoms (or electrons)	FF)	quarternary structure
33)	a fatty acid whose carbons are all joined to the maximum number of hydrogens	GG)	reduction
34)	a fatty acid that has a "kink" in it due to a double bond between carbon atoms	HH)	saturated fatty acid
35)	a disaccharide consisting of two glucose molecules	II)	secondary structure
36)	a class of molecules that includes neutral fats and steroids	JJ)	starch
37)	a chemical that resists changes in pH	KK)	tertiary structure
38)	a 6 carbon sugar that forms a 6-membered ring -- used as energy source by cells	LL)	unsaturated fatty acid
39)	three carbon that joins with fatty acids to produce triglycerides	MM)	nucleic acids
40)	molecules that store genetic information (e.g. DNA and RNA)	NN)	glycerol

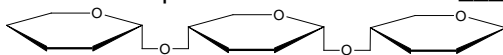
### Part B - Short Answers - 1/2 Mark for each blank

- The atomic number for carbon is six; therefore, carbon has \_\_\_\_\_ protons and \_\_\_\_\_ electrons.
- Two isotopes of carbon are  $^{13}\text{C}$  and  $^{14}\text{C}$ . The first of these has \_\_\_\_\_ neutrons and the second has \_\_\_\_\_ neutrons.
- The compound  $\text{K}^+\text{Cl}^-$  is an \_\_\_\_\_ compound, and  $\text{K}^+$  and  $\text{Cl}^-$  are \_\_\_\_\_
- In the above question, which atom has been oxidized? \_\_\_\_\_ Which has been reduced? \_\_\_\_\_
- At pH of 7,  $[\text{H}^+] = [\text{OH}^-]$ . Below pH 7, which of these is greater? \_\_\_\_\_ Bases have a pH that is \_\_\_\_\_ than 7.
- The primary structure of a protein is a polymer of \_\_\_\_\_ the secondary structure is characterized by the alpha \_\_\_\_\_ the tertiary structure is its \_\_\_\_\_ shape, and the quarternary structure is the association of more than \_\_\_\_\_ polypeptide chains.
- The molecule that cells "burn" during respiration to produce ATP is \_\_\_\_\_
- An unsaturated fatty acid contains less \_\_\_\_\_ than a saturated one.
- Both DNA and RNA are polymers of \_\_\_\_\_, each of which contains a nitrogenous \_\_\_\_\_, a 5-carbon \_\_\_\_\_, and a \_\_\_\_\_ group.
- The molecule on the right is what type of molecule? \_\_\_\_\_. What is the empirical formula of the "R" group? \_\_\_\_\_. Which side, left or right is the amino group? \_\_\_\_\_ Which side, left or right is the acid group? \_\_\_\_\_

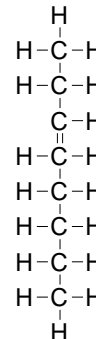
11. What are the four most common atoms in organic molecules?  
 \_\_\_\_\_
12. What are the four classes of organic compounds?  
 \_\_\_\_\_



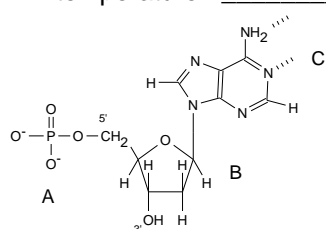
13. The molecule below belongs to what class of molecule? \_\_\_\_\_ The hydrolysis of this molecule would produce what molecule? \_\_\_\_\_



14. Of the classes listed in question 12, which is:  
 a) *most* concerned with energy transformations \_\_\_\_\_  
 b) the class that forms enzymes \_\_\_\_\_  
 c) makes up genes \_\_\_\_\_  
 d) the class that is capable of *storing* the most energy per gram \_\_\_\_\_
15. What type of molecule is the molecule to the right? \_\_\_\_\_  
 Molecules made of these molecules joined to glycerol would be at what *state* at room temperature? \_\_\_\_\_



16. The molecule at left is what type of molecule? \_\_\_\_\_  
 Label the parts of this molecules:



- A = \_\_\_\_\_  
 B = \_\_\_\_\_  
 C = \_\_\_\_\_

17. Nucleotides are connected together by bonds that form between the \_\_\_\_\_ of one nucleotide and the \_\_\_\_\_ of the other nucleotide.

18. Three molecules composed of nucleotides are \_\_\_\_\_
19. \_\_\_\_\_ are lipids containing phosphorous that are particularly important in the formation of cell membranes.
20. \_\_\_\_\_ is the act of dispersing one liquid in another, as fat in water.
21. Inorganic compounds are compound that do not contain \_\_\_\_\_ atoms.
22. Which element is most characteristic of proteins? \_\_\_\_\_
23. List 5 function of proteins, along with an example of each:

FUNCTION	EXAMPLE
TRANSPORT	HEMOGLOBIN
ENZYMES	MALTASE, TRYPSIN, PEPSIN
IMMUNE SYSTEM COMPONENTS	ANTIBODIES
STRUCTURAL COMPONENTS	COLLAGEN, MUSCLE
MOVEMENT	MUSCLE (e.g. ACTIN & MYOSIN FIBRES)
CHEMICAL MESSENGERS	PEPTIDE HORMONES (e.g. INSULIN)

24. There are, according to your textbook, \_\_\_\_\_ kinds of amino acids, which differ from each other only in their \_\_\_\_\_ groups.
25. There are a total of \_\_\_\_\_ amino acids that the human body can't manufacture, and so must be obtained from food. These are called \_\_\_\_\_ amino acids.
26. Use the following words to describe the making of a protein (an expression *may* be used more than once):  
 • *tertiary structure, hydrophobic interactions, water, -COOH, polypeptide chain, Dehydration synthesis, -NH<sub>2</sub>, secondary structure, hydrogen bonding, covalent bonds, helix, primary structure, peptide bonds*  
 \_\_\_\_\_ between amino acids joins \_\_\_\_\_ groups to \_\_\_\_\_ groups (in the process \_\_\_\_\_ molecules are removed) to form a \_\_\_\_\_. The bonds so formed are called \_\_\_\_\_. The sequence of amino acids is called the \_\_\_\_\_. The \_\_\_\_\_ is often in the form of an alpha helix, which is due to \_\_\_\_\_ between amino acids in the chain. The \_\_\_\_\_ is the three dimensional shape of the protein as it folds back on itself. This structure is held together by \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ between R groups. The shape of the protein is determined by its \_\_\_\_\_. The function of the protein is determined by its \_\_\_\_\_.
27. A protein that has lost its precise three dimensional shape has become \_\_\_\_\_. Three things that can cause a protein to become denatured are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

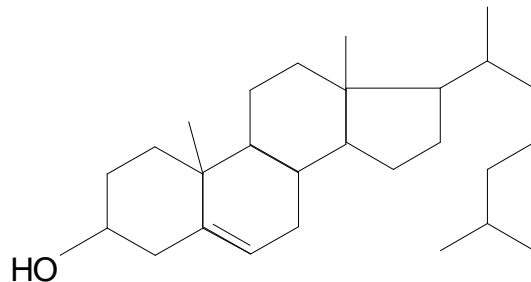


Name: \_\_\_\_\_ Block: \_\_\_\_\_ Date: \_\_\_\_\_

---

---

46. a) To what class of molecules does the molecule below belong? \_\_\_\_\_  
b) Why are these molecules grouped with lipids? \_\_\_\_\_



47. What *type* of molecule is the one below? \_\_\_\_\_ What is its full name? \_\_\_\_\_.  
Circle the bond that stores the most energy.

