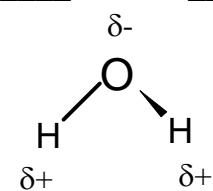
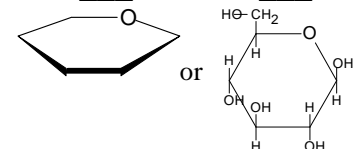
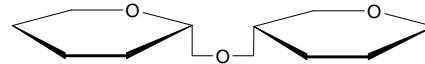
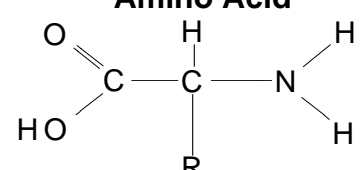
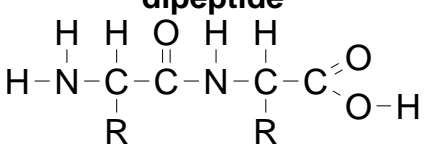
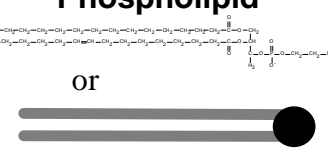
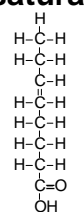
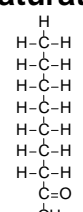
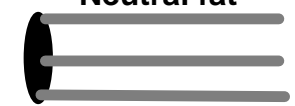
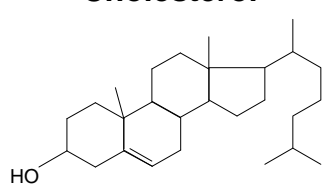
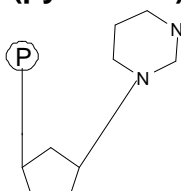
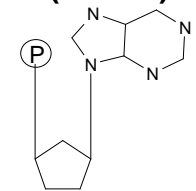
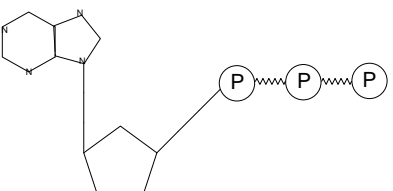
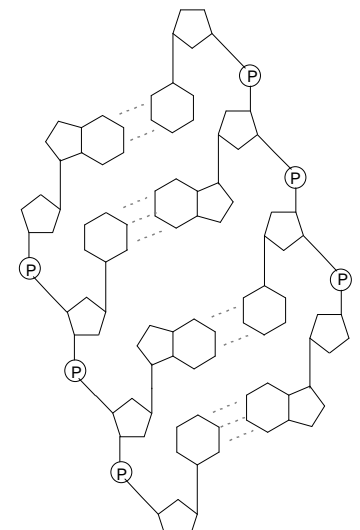
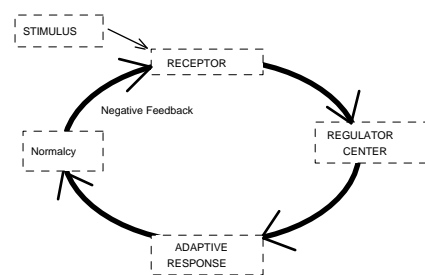


Biology 12 - Biologically Important Molecules!

Use this **repeatedly** this term to quiz yourself on biologically important molecules.

<p>WATER</p> 	<p>Glucose</p> 	<p>Disaccharide Maltose</p> 
<p>Amino Acid</p> 	<p>dipeptide</p> 	<p>Phospholipid</p> 
<p>Fatty acid Unsaturated</p> 	<p>Fatty acid Saturated</p> 	<p>Triglyceride Neutral fat</p> 
<p>Cholesterol</p> 	<p>Nucleotide (pyrimidine)</p> 	<p>Nucleotide (Purine)</p> 
<p>Adenosine Triphosphate ATP</p> 	<p>DNA</p> 	<p>Homeostasis (negative feed back)</p> 

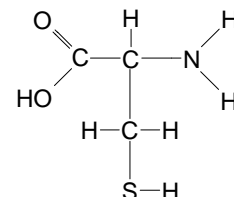
Biology 12 – Biological Molecules – Review Worksheet

- 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)

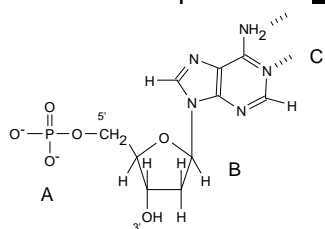
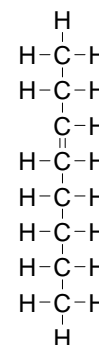
Q	1)	water-"loving"	A)	adenosine triphosphate
P	2)	water-"fearing"	B)	amino acid
FF	3)	two or more polypeptide chains coming together and bonding with each other	C)	atom
I	4)	to permanently change the 3 dimensional structure of a protein	D)	buffer
V	5)	the subunit that makes up nucleic acids - 4 types in DNA are A C G T	E)	carbohydrate
C	6)	the smallest unit of matter that cannot normally be broken into smaller particles	F)	cellulose
J	7)	the process of breaking down large fat droplets into smaller fat droplets	G)	cholesterol
GG	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
BB	9)	the linear sequence of amino acids in a protein, which ultimately determines its shape	I)	denature
B	10)	the building block of protein -- there are 20 different kinds normally found in nature	J)	emulsification
X	11)	the bond that forms between two amino acids joined by dehydration synthesis	K)	enzymes
II	12)	the 3-D shape of a polypeptide chain due to it folding back on itself and forming bonds.	L)	glucose
H	13)	creating a bond between two atoms by taking OH from one atom and H from the other	M)	glycogen
O	14)	breaking a bond between two atoms by adding OH to one atom and H to the other	N)	hydrogen bond
K	15)	biological catalysts, composed of protein, that speed up chemical reactions	O)	hydrolysis
A	16)	ATP - the molecule that carries energy in the cell	P)	hydrophobic
E	17)	any molecule with the molecular formula $C_n(H_2O)_n$	Q)	hydrophilic
Y	18)	an important component of cell membranes, has a hydrophilic head, hydrophobic tail	R)	ion
Z	19)	an enzyme that breaks down maltose to two glucose molecules	S)	lipid
R	20)	an atom or molecule that has either lost or gained electrons	T)	maltose
N	21)	a weak bond due to the attraction between partial charges on hydrogen, oxygen, and nitrogen atoms	U)	neutral fat
F	22)	a polymer of glucose, used as a structural component of plant cell walls	V)	nucleotide
M	23)	a polymer of glucose, used as a storage form for glucose in animals	W)	oxidation
HH	24)	a polymer of glucose, used as a storage form for glucose in plants	X)	peptide bond
W	25)	a loss of Hydrogen atoms (or electrons)	Y)	phospholipid
G	26)	a lipid that is an important component of cell membranes and from which steroid hormones are made	Z)	MALTASE
U	27)	a lipid composed of glycerol joined to 3 fatty acids	AA)	polymer
CC	28)	a large organic molecule formed from a chain or chains of amino acids	BB)	primary structure
AA	29)	a large molecule made by joining together smaller identical (or similar) molecules	CC)	protein
EE	30)	a gain of Hydrogen atoms (or electrons)	DD)	quaternary structure
FF	31)	a fatty acid whose carbons are all joined to the maximum number of hydrogens	EE)	reduction
JJ	32)	a fatty acid that has a "kink" in it due to a double bond between carbon atoms	FF)	saturated fatty acid
T	33)	a disaccharide consisting of two glucose molecules	GG)	secondary structure
S	34)	a class of molecules that includes neutral fats and steroids	HH)	starch
D	35)	a chemical that resists changes in pH	II)	tertiary structure
L	36)	a 6 carbon sugar that forms a 6-membered ring -- used as energy source by cells	JJ)	unsaturated fatty acid
LL	37)	three carbon that joins with fatty acids to produce triglycerides	KK)	nucleic acids
KK	38)	molecules that store genetic information (e.g. DNA and RNA)	LL)	glycerol

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

- At pH of 7, $[H^+] = [OH^-]$. Below pH 7, which of these is greater? **[H⁺]**. Bases have a pH that is **GREATER** than 7.
- The primary structure of a protein is a polymer of **AMINO ACIDS**. The secondary structure is characterized by the alpha **HELIX**. The tertiary structure is its **3-D** shape, and the quaternary structure is the association of more than **ONE** polypeptide chains.
- The molecule that cells "burn" during respiration to produce ATP is **GLUCOSE**.
- An unsaturated fatty acid contains less **HYDROGEN** than a saturated one.
- Both DNA and RNA are polymers of **NUCLEOTIDES**, each of which contains a nitrogenous **BASE**, a 5-carbon **SUGAR**, and a **PHOSPHATE** group.
- The molecule on the right is what type of molecule? **AMINO ACID**. What is the empirical formula of the "R" group? **CH₃S**. Which side, left or right is the amino group? **RIGHT** Which side, left or right is the acid group? **LEFT**
- What are the four classes of organic compounds? **PROTEINS, CARBOHYDRATES, LIPIDS, NUCLEIC ACIDS**
- The molecule below belongs to what class of molecule? **CARBOHYDRATE**
The hydrolysis of this molecule would produce what molecule? **GLUCOSE**



- Of the classes listed in question 12, which is:
 - most concerned with energy transformations **CARBOHYDRATES**
 - the class that forms enzymes **PROTEINS**
 - makes up genes **NUCLEIC ACIDS**
 - the class that is capable of *storing* the most energy per gram **LIPIDS**
- What type of molecule is the molecule to the right? **MONO-UNSATURATED FATTY ACID**. Molecules made of these molecules joined to glycerol would be at what *state* at room temperature? **LIQUID**



- The molecule at left is what type of molecule? **PURINE NUCLEOTIDE** Label the parts of this molecules:
 A = **PHOSPHATE GROUP**
 B = **5-CARBON SUGAR (DEOXYRIBOSE)**
 C = **BASE**
- Nucleotides are connected together by bonds that form between the **PHOSPHATE** of one nucleotide and the **SUGAR** of the other nucleotide.

- Three molecules composed of nucleotides are **DNA, RNA, ATP**
- PHOSPHOLIPIDS** are lipids containing phosphorous that are particularly important in the formation of cell membranes.
- EMULSIFICATION** is the act of dispersing one liquid in another, as fat in water.
- Inorganic compounds are compound that do not contain **CARBON** atoms.
- 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)

-
18. There are a total of **EIGHT** amino acids that the human body can't manufacture, and so must be obtained from food. These are called **ESSENTIAL** amino acids.
19. 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, -NH₂, secondary structure, hydrogen bonding, covalent bonds, helix, primary structure, peptide bonds*
- DEHYDRATION SYNTHESIS** between amino acids joins **-NH₂** groups to **-COOH** groups (in the process **WATER** molecules are removed) to form a **POLYPEPTIDE CHAIN**. The bonds so formed are called **PEPTIDE BONDS**. The sequence of amino acids is called the **PRIMARY STRUCTURE**. The **SECONDARY STRUCTURE** is often in the form of an alpha helix, which is due to **HYDROGEN BONDING** between amino acids in the chain. The **TERTIARY STRUCTURE** is the three dimensional shape of the protein as it folds back on itself. This structure is held together by **HYDROGEN BONDING**, **HYDROPHOBIC INTERACTIONS**, and **COVALENT BONDS** between R groups. The shape of the protein is determined by its **PRIMARY STRUCTURE**. The function of the protein is determined by its **PRIMARY STRUCTURE**.
20. A protein that has lost its precise three dimensional shape has become **DENATURED**. Three things that can cause a protein to become denatured are **HEATING**, **PH CHANGES**, **METABOLIC POISONS (LIKE HEAVY METALS E.G. LEAD, MERCURY, CADMIUM)**
21. Two main functions of carbohydrates in living systems are in **SHORT**-term energy sources, and structural components of cell **WALLS** in plants.
22. **STARCH** has few side branches of glucose chains, and is the storage form of glucose in plants. Since it contains many glucose molecules joined together, it is called a **POLYSACCHARIDE**.
23. **GLYCOGEN** has many side branches of glucose chains, and is the storage form of glucose in **ANIMALS**. The **LIVER** is the main organ that produces, breaks down, and stores this polysaccharide.
24. "Roughage" or "Fibre" in our diet is actually due to the presence of **CELLULOSE**, another polymer of glucose found only in **PLANTS**.
25. A pentose sugar contains **FIVE** carbons, while a hexose sugar contains **SIX**. An example of a pentose monosaccharide is **RIBOSE OR FRUCTOSE**. An example of a hexose is **GLUCOSE**.
26. Table sugar is a **DISACCHARIDE** made of one molecule of glucose and one molecule of the pentose **FRUCTOSE**.
27. Lipids are organic compounds that are **INSOLUBLE** in water. In the body, they serve as **LONG**-term energy storage molecules. Lipids include fats, **OILS**, and **WAXES**.
28. The 3 most important classes of lipids are neutral fats, **PHOSPHOLIPIDS**, and **STEROIDS**.
29. Oil, fat, butter are all composed of lipid molecules called **TRIGLYCERIDES** (or **NEUTRAL FATS**). Neutral fats are composed of two types of molecules: **GLYCEROL** and **FATTY ACIDS**.
30. Most fatty acids contain about **16 TO 18** carbon atoms in a long chain. Saturated fatty acids have no **DOUBLE** bonds between carbon atoms, and tend to be solid at room temperature. Unsaturated fatty acids are most often found in vegetable oils, and account for the fact that they are liquid at room temperature.
31. Butter contains a large proportion of **UNSATURATED** fatty acids. Excess intake of this type of fatty acid is known to cause **HEART** attacks and strokes.
32. Soap is a **MOLECULE** formed when a **FATTY ACID** is reacted with an inorganic base such as **NaOH**. Soap allows oils to be mixed with water by **EMULSIFYING** the oils.
33. A **phospholipid** is a lipid made of glycerol, 2 fatty acids, and a phosphate group. It is the primary component of membranes. The phosphate "head" is **HYDROPHILIC**, the tail is **HYDROPHOBIC**.
34. **STEROIDS** are small lipids containing rings that are all derived from cholesterol. An important function of these compounds are sex **HORMONES** like progesterone.
35. Place the following terms in order of increasing size: DNA, nucleus, RNA, cell, nucleotide, gene, chromosome: **NUCLEOTIDE, RNA, DNA, GENE, CHROMOSOME, NUCLEUS, CELL**

