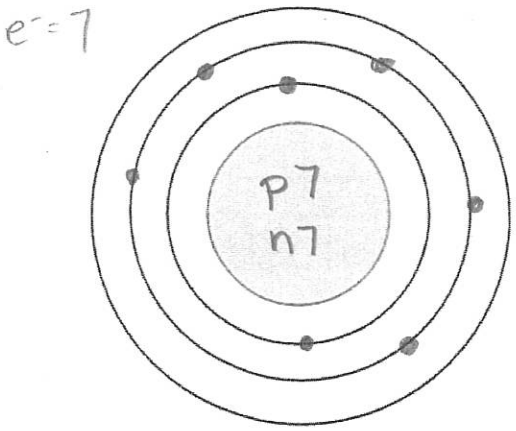
Life Science STUDY GUIDE Ch 3: Chemistry & Biomolecules

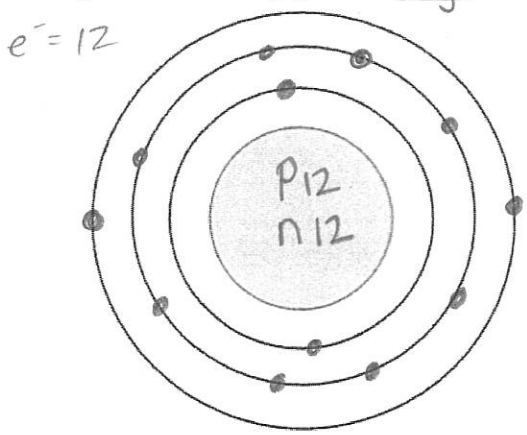
Name KEY Section ____

1. Fill in the atomic models below with protons, neutrons, and electrons.

Nitrogen atom (Symbol: N)

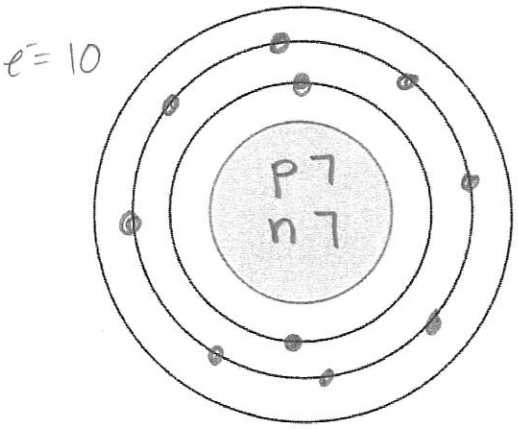


Magnesium atom (Symbol: Mg)

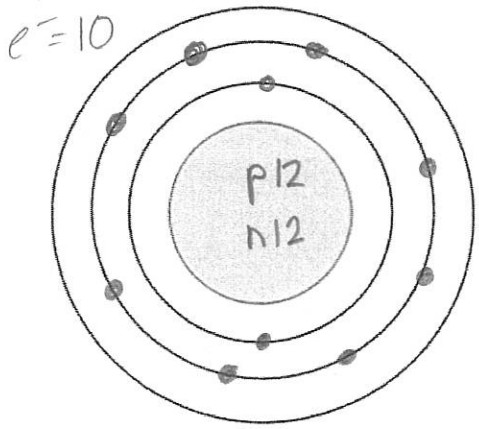


2. Fill in the atomic models below with protons, neutrons, and electrons.

Nitrogen ion (gains 3 electrons) (Symbol: N^{-3})



Magnesium ion (loses 2 electrons) (Symbol: Mg^{+2})



3. Define ion: An atom that has gained or lost electrons

4. Name the 6 elements common to all living things. (C H N O P S)

carbon, hydrogen, nitrogen, oxygen, phosphorus, & sulfur

5. Elements are arranged on the periodic table in order of their Atomic #s.

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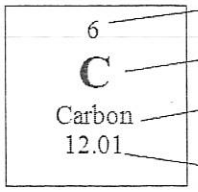
6. Label the parts of the following element.



Atomic #
Element Symbol
Element Name
Average Atomic Mass

7. What is the average percent water composition for a human? 66% ~ $\frac{2}{3}$

8. What is the importance of water in the body?
Helps maintain homeostasis & chemical reactions/processes rely on water

9. List at least 4 properties of water. polarity, adhesion, cohesion, surface tension

10. What type of bonds do water molecules form with other water molecules?
Hydrogen bonds

11. What type of bond forms when two or more atoms share electrons? Covalent bond

    a. If the atoms are of **unequal** "strengths" what type of bond forms? polar

    b. If the atoms are of **equal** "strengths" what type of bond forms? nonpolar

12. What type of bond forms when two or more atoms exchange electrons, and become magnetically attracted to one another? ionic bond

13. What are the 2 criteria for hydrogen bonding?
* Must have hydrogen
* And, one of the following: Nitrogen, Oxygen, OR fluorine

14. What is the difference between an organic compound and an inorganic compound?
* Organic compounds make up living thing & contain carbon
* Inorganic compounds do not make up living things.

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15. Fill in the following table:

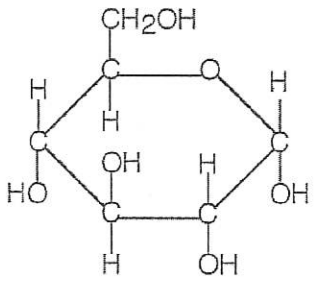
Biomolecule (Polymer)	Monomer	What atoms it is made up of?	How many calories released per 1 gram?
1. Carbohydrates	Monosaccharides	C, H, O	4
2. Lipids	Fatty Acids	C, H, O	9
3. Proteins	Amino Acids	C, H, N, O, S	4
4. Nucleic Acids	Nucleotides	C, H, O, N, P	N/A

16. Identify the following biomolecules, label them as one of the following: carbohydrate, lipid, protein, or nucleic acid.

★ also good answers → (Cellular respiration and photosynthesis)

17. Carbohydrates play a role in structure and energy production/storage

18. The following is a model of glucose, it is a monosaccharide.



19. What are two examples of polysaccharides that play a role in energy storage in plants and animals?
    a. Plants: starch
    b. Animals: glycogen

20. What are two examples of polysaccharides that play a structural role in plants and animals?
    a. Plants: cellulose
    b. Animals: chitin

21. Lipids play a role in long-term energy storage.

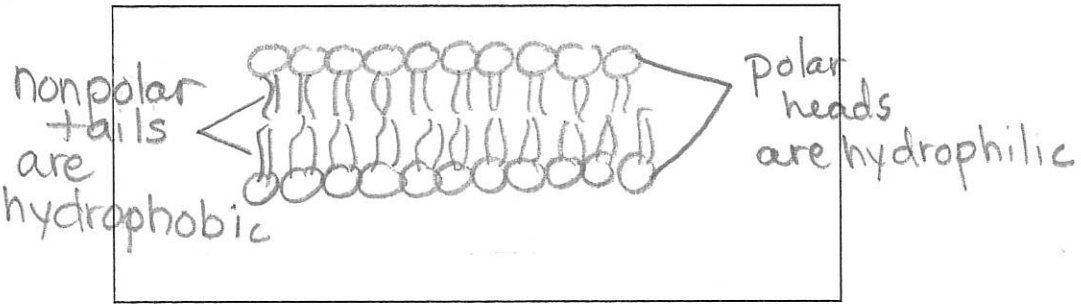
22. Are lipids polar or nonpolar? nonpolar

23. A triglyceride is an example of a fat (lipid) that is composed of three fatty acids and a glycerol molecule.

24. A fatty acid is a molecule composed of a long chain of C and H atoms bonded to a carboxyl group.

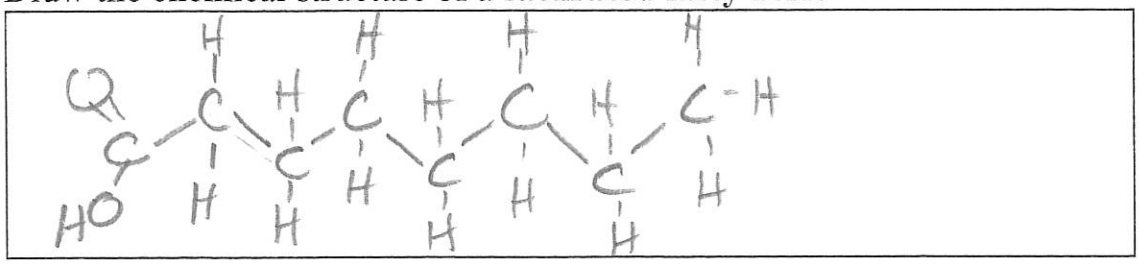
25. What type of lipid makes up the cell membrane and the membrane of many organelles? phospholipid

26. Draw a portion of a cell membrane using the lipid from ~~question #16.~~ your notes. Label the polar heads, non-polar tails, and the hydrophilic and hydrophobic ends.



27. chlorophyll is a lipid that absorbs light energy in plants and gives plants their green color.

28. Draw the chemical structure of a **saturated fatty acid**:



29. What are 2 examples of food that contain saturated fat? meat & dairy products

30. What is the state of matter of saturated fat at room temperature? solid

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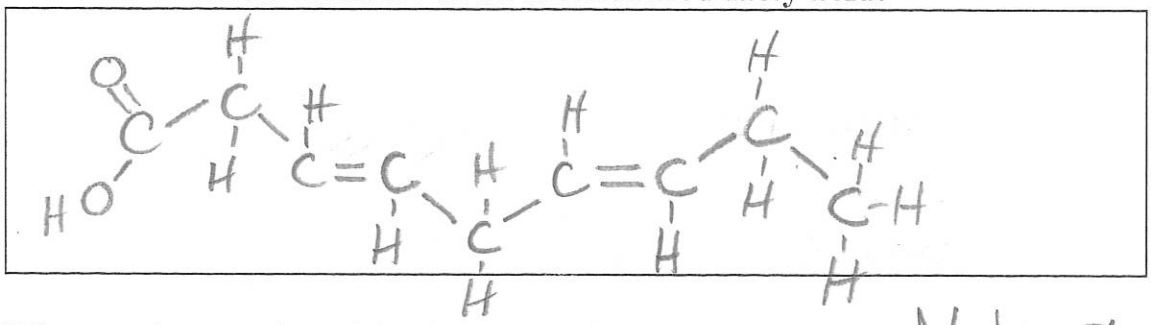
31. Draw the chemical structure of an **unsaturated fatty acid**:

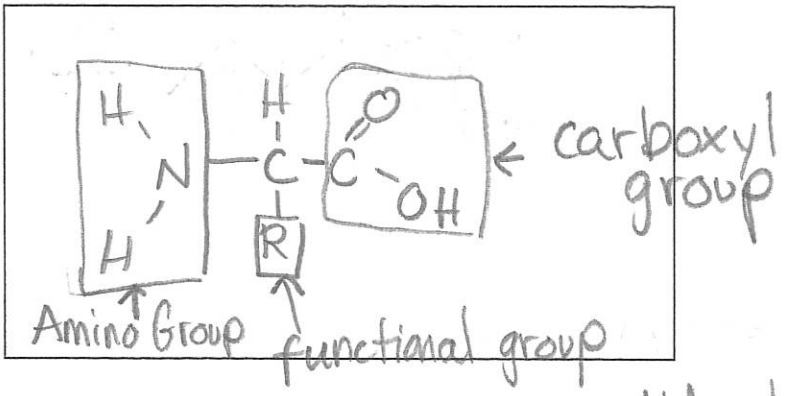


32. What are 2 examples of food that contain unsaturated fat? Nuts (or seeds) & oils

33. What is the state of matter of unsaturated fat at room temperature? liquid

34. Which type of fat is best for a healthy lifestyle? unsaturated

35. Draw the chemical structure of an amino acid:



36. What are the bonds called that link amino acids together? peptide bonds

37. How many different amino acids are there? 20

38. The shape of a protein determines its function.

39. What are 6 important functions of proteins? Describe each:

a. 1) Structure, repair, & maintenence
- Proteins are building blocks of the body, they build things like hair, skin, nails, bone, ligaments, cartilage, etc.

b. 2) Energy
- 4 calories / gram of protein

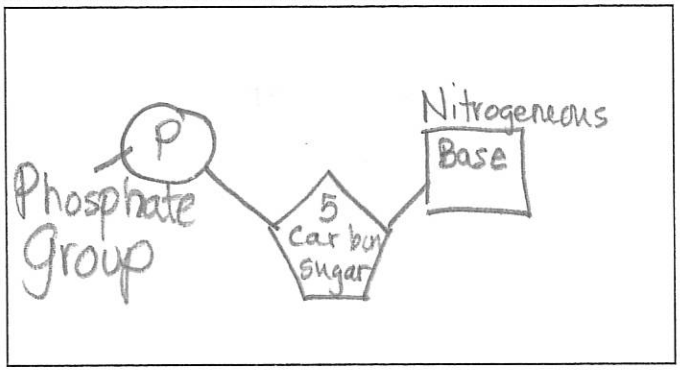
c. 3) Enzymes (end in "ase")
= Proteins that speed up chemical reactions & aid in digestion

d. 4) Hormone Production
- Involved w/ Producing hormones like insulin & secretin.

e. 5) Transport & Storage of Molecules
- Help get material into and out of cells.
- Red Blood cells are proteins that transport Oxygen.

f. 6) Antibodies
- Proteins that identify and help destroy pathogens.

40. Draw the basic chemical structure of a nucleotide. Label the three components:



41. What are the 4 nitrogenous bases found in DNA? (Full names not abbreviation)
Adenine (A), Thymine (T), cytosine (C), & guanine (G)

42. What are the 4 nitrogenous bases found in RNA? (Full names not abbreviation)
Adenine (A), Uracil (U), cytosine (C), & guanine (G)

43. Complete the table to contrast DNA & RNA.

Characteristics	DNA	RNA
Nucleotides	deoxyribose sugar	ribose sugar
Nitrogenous bases	A, T, C, G	A, U, C, G
Nucleic acid Structure	Double-stranded	single stranded
Where are they found?	Nucleus	Nucleus & cytoplasm
What are their functions?	Makes RNA/ Genetic Material	Makes proteins