

Standard #6: Chemistry of Living Systems: Principles of chemistry underlie the functioning of biological systems.

- a. CARBON, because of its ability to combine in many ways with itself & other elements, has a central role in the chemistry of living organisms.
- b. Living organisms are made of molecules consisting largely of carbon, Hydrogen, nitrogen, oxygen, phosphorus, & sulfur.
- c. Living organisms have many different kinds of molecules, including small ones, such as water & salt, and very large ones, such as Carbohydrate, fats, proteins, and DNA.

Turn to page 407. Read all 3 paragraphs on the page & answer the questions

1. What are organic compounds? molecules made of carbon
2. Why is carbon such an important element? 4 valence electrons . forms 4 Bonds
can make Huge long chains
-c-c-c-c-c-c-

2. Body Chemistry: use bk: pgs 408-411 &

- www.brainpop.com : Body Chemistry
- Username: mms308, password; marshall



BODY CHEMISTRY

_____ 4 pts

	What is it?	Examples	Why does the body need them?
Carbohydrates	<u>Sugar/starches</u> <u>Simple + complex</u>	• <u>Fruit</u> • <u>Bread</u> • <u>PASTAS</u>	<u>Short term energy</u>
Lipids "Fats"	<u>fatty acid chains</u> <u>Do NOT dissolve in H₂O</u>	• <u>FATS</u> • <u>OILS</u> • <u>WAXES</u>	<u>Long TERM energy</u>
Proteins	<u>made of amino Acids</u>	• <u>MEAT</u> • <u>FISH</u> • <u>BEANS</u>	<u>Strength (muscles!)</u>
Nucleic Acid "DNA"	<u>store information</u> <u>to build proteins</u>	• DNA • RNA	<u>Codes for genes</u>

3. DNA: Watch the Brainpop on "DNA", then answer the quiz questions below.

1/2 pt ea ____/3

1. What is the shape of a DNA molecule?
A a. A double helix b. a double sphere c. a double torus
2. What does DNA stand for?
C a. Dexo-nucleic Acid b. Deoxynuclear acid **c.** Deoxyribonucleic acid
3. Cytosine, guanine, adenine & thymine are examples of
A a. Chemical bases b. Riobosomes c. DNA insulators
4. What sugar is found in DNA?
C a. Glucose b. Sucrose **c.** Deoxyribose
5. What acts as the "rungs" of the ladder & links the sugars together?
B a. String **b.** Phosphate c. Lipids
6. What is the process of cloning?
A a. Copying the DNA of a living organism & using it to grow new ones
b. Creating an animal from a selection of plants
c. Mixing blood types to create a new one

Complete the virtual DNA Extraction Lab DNA Extraction lab
<http://learn.genetics.utah.edu/content/labs/extraction/>

1 pt ea ____/6

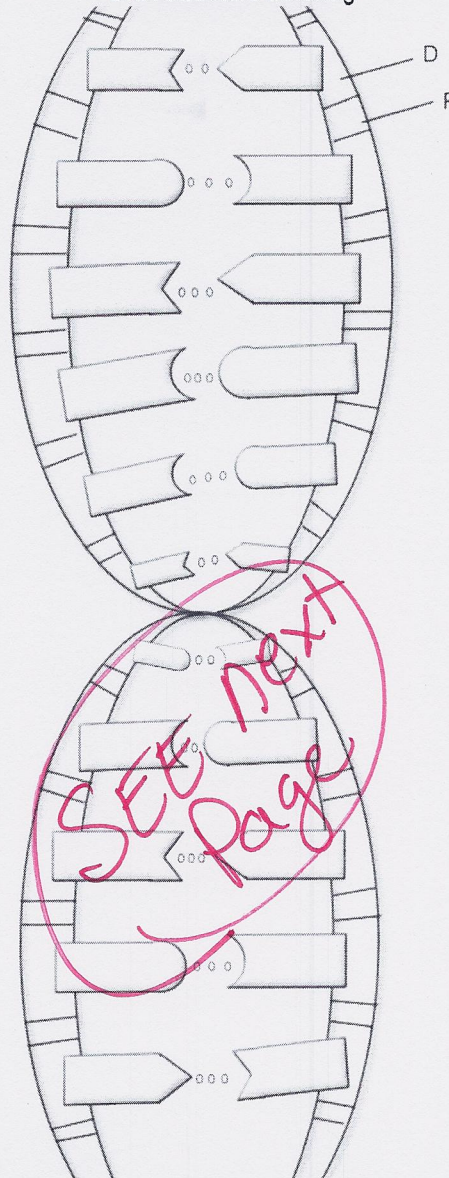
- What are the 4 steps to doing this lab:
- _____
 - _____
 - _____
 - _____

- Write 2 things that you learned by doing this lab:
- _____
 - _____

Sample Test Questions:

- C** 1. What characteristic of carbon (C) makes it essential to living organisms?
 - a. Carbon forms crystal structures under certain conditions.
 - b. Carbon can exist as a solid, liquid, or gas.
 - c** Carbon bonds in many ways with itself to form chains.
 - d. Carbon exists in radioactive forms.
- D** 2. Which of the following elements is best able to combine with itself and hydrogen (H) to form large molecules?
 - a. sodium (Na)
 - b. lithium (Li)
 - c** sulfur (S)
 - d** carbon (C)
- A** 3. Which of the following compounds is most likely to be part of living organisms?
 - a**. $C_6H_{12}O_6$
 - b. BF_3
 - c. $MoCl_2$
 - d. CaI
- B** 4. Which of the following is NOT one of the most common elements in your body?
 - a. phosphorous
 - b** helium
 - c. oxygen
 - d. nitrogen
- A** 5. Which of the following is NOT a biochemical?
 - a**. propane
 - b. proteins
 - c. lipids
 - d. carbohydrates
- C** 6. Which of the following is a kind of biochemical that does not dissolve in water and that makes up cell membranes, fats, oils, and waxes?
 - a. glycogen
 - b. carbohydrate
 - c** lipid
 - d. cellulose
- D** 7. Molecules of simple sugars can join to form long strings. What are these long strings of sugars called?
 - a. triple bonds
 - b. carbon backbones
 - c. nucleic acids
 - d** complex carbohydrates
- C** 8. What is the term for the genetic material of a cell?
 - a. hormones
 - b. hemoglobin
 - c** DNA
 - d. protein
- B** 9. Which of the following make up proteins?
 - a. lipids
 - b** amino acids
 - c. nucleic acids
 - d. carbohydrates
- B** 10. Which of the following is NOT a biochemical?
 - a) carbohydrates
 - b**) propane
 - c) proteins
 - d) lipids
- D** 11. Molecules of simple sugars can join to form long strings. What are these long strings of sugars called?
 - a) triple bonds
 - b) carbon backbones
 - c) nucleic acids
 - d**) complex carbohydrates
- A** 12. What characteristic of carbon (C) makes it essential to living organisms?
 - a**) Carbon bonds in many ways with itself to form chains.
 - b) Carbon exists in radioactive forms.
 - c) Carbon forms crystal structures under certain conditions.
 - d) Carbon can exist as a solid, liquid, or gas.

DNA Structure Coloring



- Color the thymines orange.
- Color the adenines green.
- Color the guanines purple.
- Color the cytosines yellow.
- Color the hydrogen bonds grey
- LABEL all 5 of these**

DNA Structure Coloring Instructions

The rungs of the ladder are pairs of 4 types of nitrogen bases. The bases are known by their coded letters A, G, T, C. These bases always bond in a certain way. Adenine will only bond to thymine. Guanine will only bond with cytosine. This is known as the "Base-Pair Rule". The bases can occur in any order along a strand of DNA. The order of these bases is the code the contains the instructions. For instance ATGCACATA would code for a different gene than AATTACGGA. A strand of DNA contains millions of bases. (For simplicity, the image only contains a few.)

Note that that the bases attach to the sides of the ladder at the sugars and not the phosphate.

The DNA helix is actually made of repeating units called nucleotides.

Each nucleotide consists of three molecules:

a sugar (deoxyribose),

a phosphate which links the sugars together,

and then one of the four bases.

Two of the bases are purines - adenine and guanine. The pyrimidines are thymine and cytosine.

The two sides of the DNA ladder are held together loosely by hydrogen bonds. The DNA can actually "unzip" when it needs to replicate - or make a copy of itself. DNA needs to copy itself when a cell divides, so that the new cells each contain a copy of the DNA. Without these instructions, the new cells wouldn't have the correct information. The hydrogen bonds are represented by small circles.

1 pt for each correct color ___ 5
1 pt for labeling: ___ 5

11. Molecules of simple sugars can join to form long strings. What are these long strings of sugars called?

- a) triple bonds
- b) carbon backbones
- c) nucleic acids
- d**) complex carbohydrates

12. What characteristic of carbon (C) makes it essential to living organisms?

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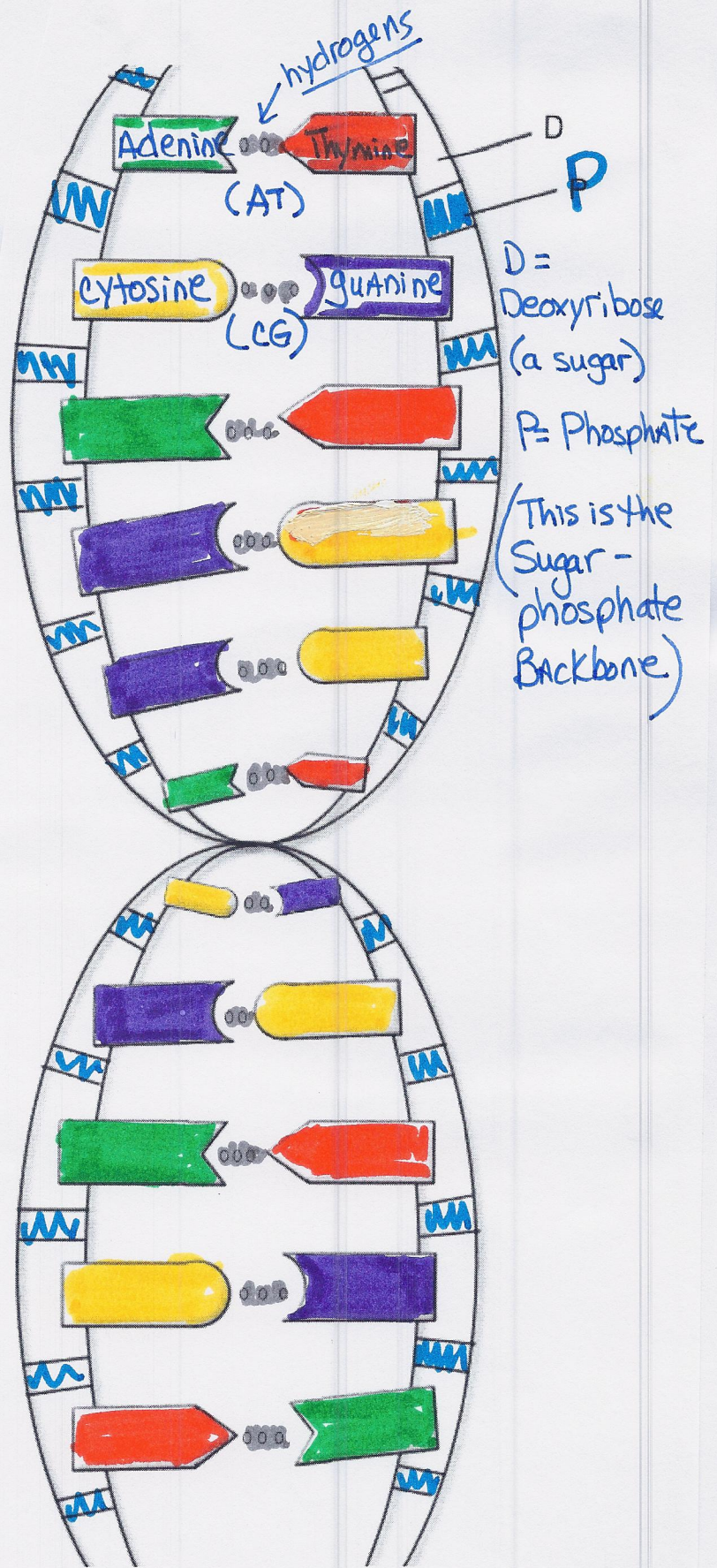
13. A base sequence is shown as: ACAGTGC

- C** How would the base sequence be coded on the other half?
- a) TGCCACG
 - b) ACAGTGC
 - c**) TGTCACG
 - d) CACTGUA

14. Mutations within a DNA sequence are





- a**) natural processes that produce genetic diversity.
- b) natural processes that always affect the phenotype.
- A** c) unnatural processes that always affect the phenotype.
- d) unnatural processes that are harmful to genetic diversity.

1 pts each ___/14 pts



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Extra Page
Day 5