

T-GB General Biology Week 10 11/7

~~Watson-Crick Base Pair~~
~~Rosalind Franklin~~

Purine (heterocyclical) Pyrimidine (monocyclical)

A — T/U

G — C

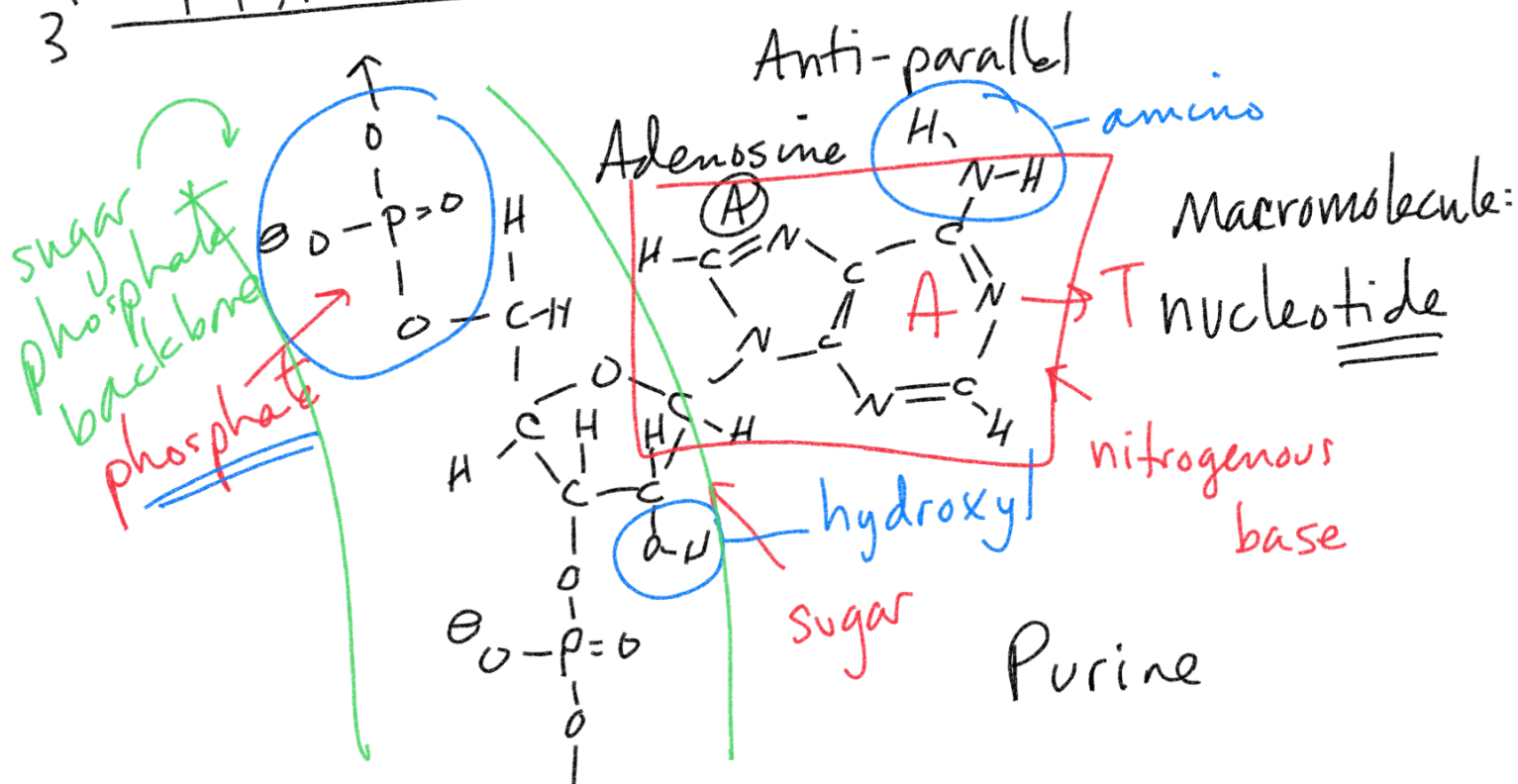


Sense strand

5' ————— 3'
A A T G C C A T G C C T A
H-bonds → | | | | | | | | | | | | | | | |
3' ————— 5'
T T A C G G T A C G G A T

Nitrogenous bases
bind through hydrogen
bonds

Anti-sense strand



General Biology

Unit 1 Pre-Test

1.) (3 pts) Describe the difference between an element and a compound.

Element → an atom defined by the number of protons.
Compound → Collection of two or more different atoms/elements in a fixed ratio with set properties

2.) (3 pts) Fill in the following chart:

Subatomic particle	Location	Charge
electron	outside (ring)	—
neutron	nucleus	none
proton	nucleus	+

3.) (3 pts) Answer the following based on the diagram below.

Protons: 9 mass - number **¹⁹F**
Neutrons: 10 $19 - 9 = 10$
Electrons: 9

4.) (3 pts) Describe the difference between a covalent and ionic bond.

Covalent bond - shared valence electrons between two atoms. **Stronger**

Ionic bond - no electron sharing. Charge - charge interactions $+||| -$ where ions are attracted based on presence or absence of electrons

5.) (4 pts) Name the six major elements of life. Why are they so prominently featured in organisms?

CHONPS

Carbon
hydrogen

major component
in
macromolecules

oxygen

found in fats,

nitrogen

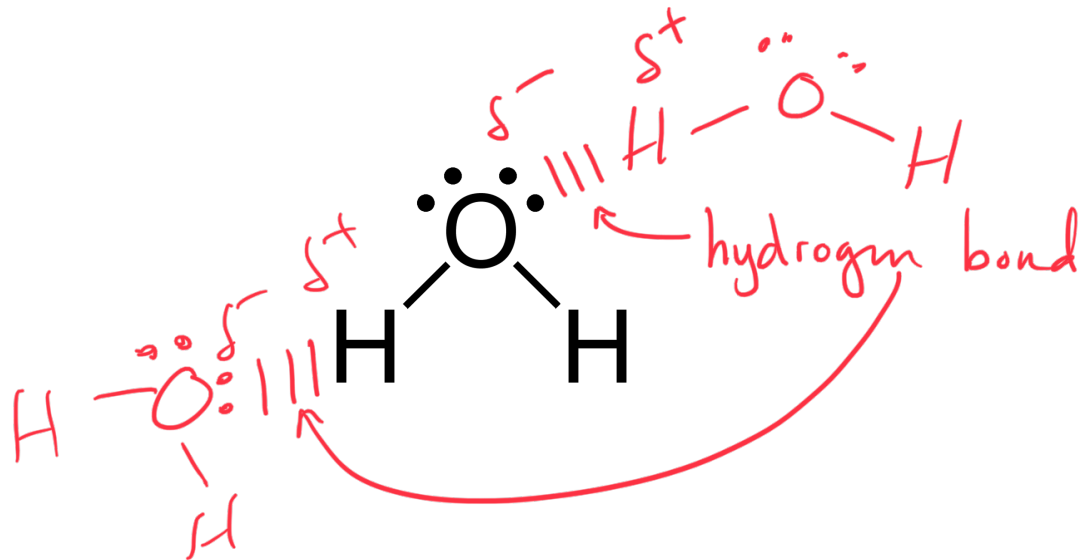
phosphorus

proteins, nucleic
acids, and

sulfur

carbohydrates

6.) a) (4 pts) Draw another water molecule appropriately bonded to the given water molecule.



b) (1 pt) This behavior is an example of what property of water?

Cohesion

7.) (3 pts) Describe the difference between thermal energy and temperature.

thermal energy → total heat.

temperature → average heat/movement

8.) (2 pts) How does sweating cool us down?

Heat transfers from our body and causes the sweat to evaporate.

9.) (2 pts) Why does living by the ocean moderate temperature? Use specific terminology.

Water absorbs/releases large amounts of heat due to its high specific heat. Water serves as a buffer since it resists changes in temperature.

10.) (3 pts) Fill in the blank with the appropriate term.

i) Liquid, homogeneous mixture of two or more substances Solution

ii) Dissolving agent solvent

iii) Dissolved substance solute

a) solute

b) solution

c) solvent

11.) (3 pts) Define acids and bases in terms of H^+ concentration.

Acid - pH below 7, high $[H^+]$, donates H^+
Base - pH above 7, low $[H^+]$, accepts H^+

12.) (4 pts) Calculate the pH based on each of the following:

a) $[H^+] = 10^{-3} \rightarrow 3$

b) $[H^+] = 10^{-8} \rightarrow 8$ $pH + pOH = 14$

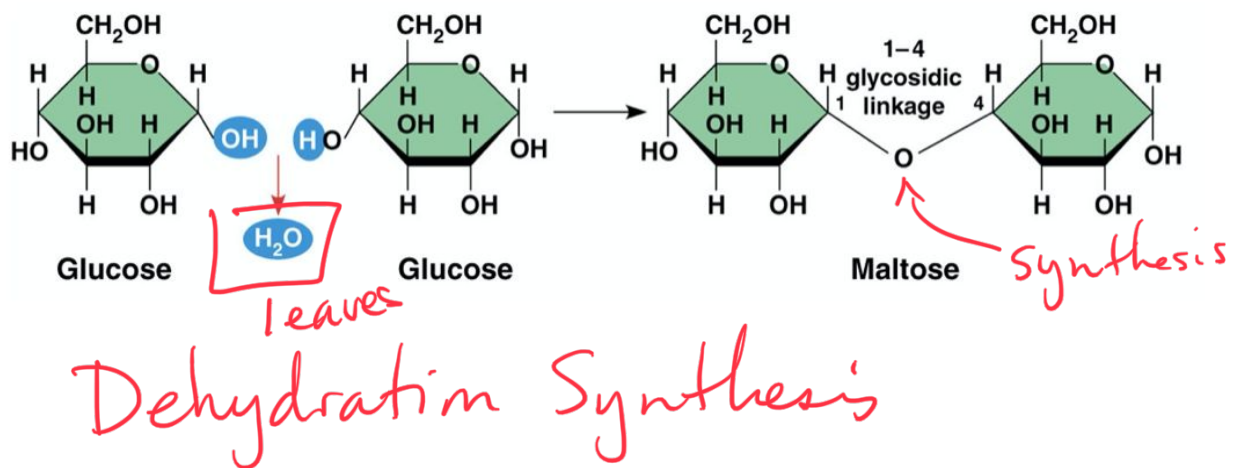
c) $[OH^-] = 10^{-9}$ $pOH = 9$ $pH = 5$

d) $[OH^-] = 10^{-6}$ $pOH = 6$ $pH = 8$

13.) (2 pts) Define the idea of a buffer.

Resists change.

14.) (5 pts) What type of reaction is featured below? Describe what is happening in the process.



15.) (3 pts) What is primary protein structure?

*sequence of amino acids...
secondary → repeated patterns
tertiary → shape of protein*

16.) (5 pts) Describe how a protein folds in an aqueous environment. What is the key factor?

key factor: water. In aqueous environment, polar amino acids orient outward, while nonpolar amino acids orient inward to protect themselves against the repulsive polar water. Protein collapses into functional form.

quaternary - combination of different polypeptides

shape of protein determines its function.

17.) (3 pts) What is protein denaturation? What are some of the main causes?

Protein denaturation → protein misfold
Causes: heat, acid

18.) (4 pts) Compare and contrast the structure and functionality of DNA and RNA.

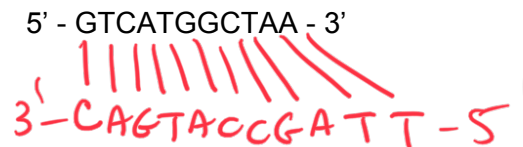
(T)	<u>DNA</u> double strand deoxyribose sugar stores info	(U)	<u>RNA</u> single strand ribose sugar transfers info
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19.) (3 pts) Describe the flow of information in a cell.

Central Dogma of Biology

DNA $\xrightarrow{\text{transcribed}}$ RNA $\xrightarrow{\text{translated}}$ protein

20.) (5 pts) Provide the complementary sequence:



21.) (2 pts) Compare and contrast cellulose and starch.

Both glucose polymers

cellulose - plant cell wall - β -linkages no digest
structural

starch - energy/storage - α -linkages
digest

- 22.) (4 pts) What is the major structural difference between a saturated and unsaturated fatty acid? How does this difference affect melting temperature?

saturated fatty acids → no double bonds
higher melting temp. solid @ room temp (butter)

unsaturated — has double bonds
lower melting temp liquid @ room temp (oil)

- 23.) (2 pts) Define amphipathic.

both solution property

Structure that contains both polar and nonpolar regions ex: Fatty acid

- 24.) (4 pts) Provide a major function for each of the macromolecules.

Amino Acids / Proteins — catalyze reactions, structural

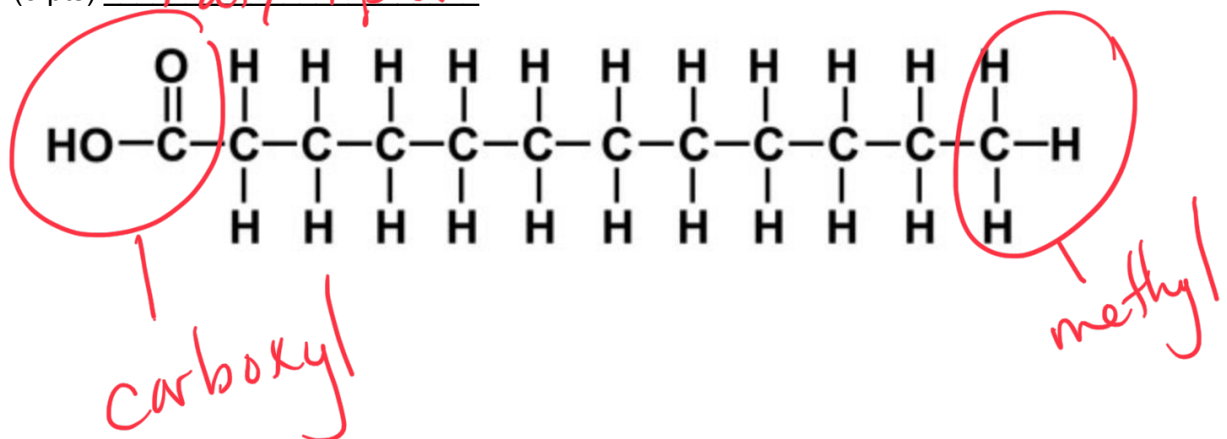
Carbohydrates — fuel / storage — building material

Fats / Lipids — energy storage

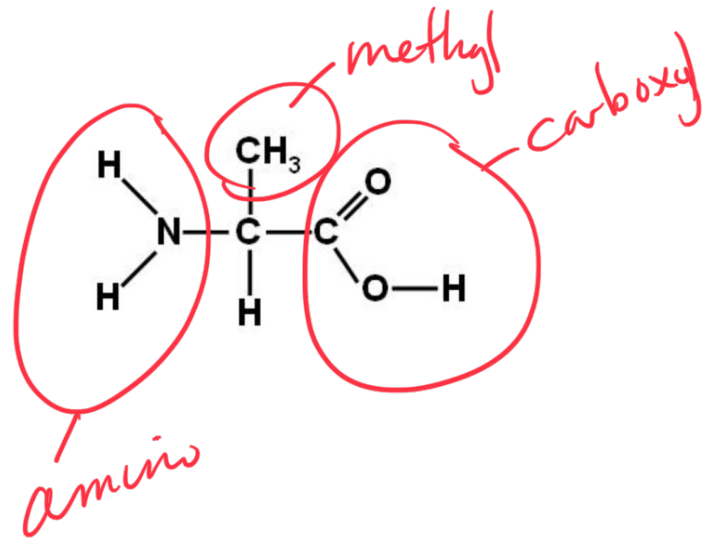
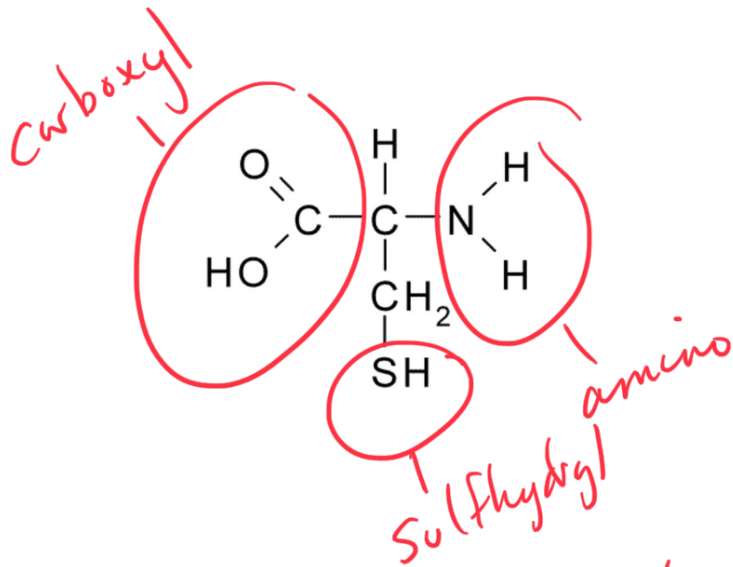
Nucleic acids — store / transfer information

- 25.) (20 pts total) Name each of the following macromolecules. Circle and label each functional group.

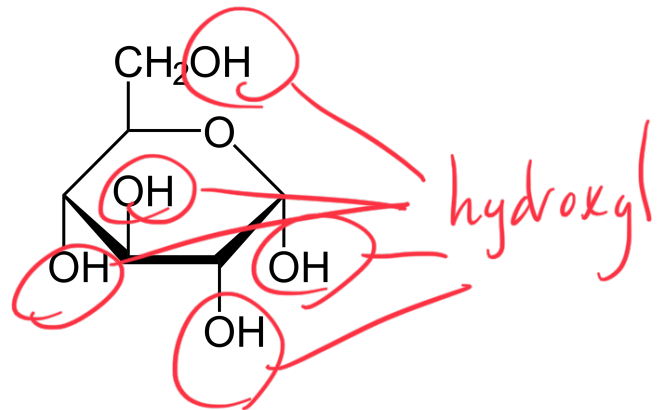
a) (5 pts) Fat / lipid CHs



b) (5 pts) Amino Acid



c) (5 pts) Carbohydrate



d) (5 pts) nucleic acid

