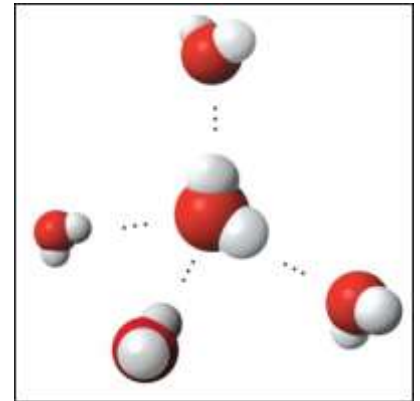


Name: \_\_\_\_\_  
\_\_\_\_ Period

Date: \_\_\_\_\_  
AP Biology Summer Assignment

Directions: Read the assigned chapters in the book and complete this directed reading guide. For your own benefit please do not leave this assignment until the week before summer vacation ends. This is an individual assignment, as such, it is expected that all work on this will be your own. This assignment is DUE to your AP Biology teacher on the first day of school.

1. Use the picture of the water molecules on the right to complete the following.
  - Using a blue pen, label oxygen (O) and hydrogen (H) on the central water molecule.
  - Using a blue pen, add + and - signs to indicate the charged regions of each molecule.
  - Using a yellow highlighter, indicate the hydrogen bonds.
  - What is a polar molecule?



\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- Why is water considered polar?

\_\_\_\_\_  
\_\_\_\_\_

- Explain hydrogen bonding.

\_\_\_\_\_  
\_\_\_\_\_

- How many hydrogen bonds can a single water molecule form?

\_\_\_\_\_  
\_\_\_\_\_

2. Distinguish between cohesion and adhesion.

\_\_\_\_\_  
\_\_\_\_\_

3. What is demonstrated when you see beads of water on a waxed car hood?

\_\_\_\_\_  
\_\_\_\_\_

4. Which property explains the ability of a water strider to walk on water?

\_\_\_\_\_  
\_\_\_\_\_

5. Define calorie.

\_\_\_\_\_  
\_\_\_\_\_

6. Ice floats! So what? Consider what would happen if ponds and other bodies of water accumulated ice at the bottom.

\_\_\_\_\_  
\_\_\_\_\_

7. Explain why ice floats. Why is 4°C the critical temperature in this story?

\_\_\_\_\_  
\_\_\_\_\_

8. Define evaporation.

\_\_\_\_\_  
\_\_\_\_\_

9. What is heat of vaporization?

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10. Water has high specific heat.

- What does this mean?

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- How does the specific heat of water compare to the specific heat of alcohol?

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- Explain how hydrogen bonding contributes to water's high specific heat.

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- Summarize how water's high specific heat contributes to the moderation of temperature.

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- How is this property important to life?

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11. Explain at least three effects of evaporation on living organisms.

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

12. Review and define these terms:

- Solvent

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- Solution

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- Solute

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- Hydrophobic

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- Hydrophilic

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13. Explain why water is such a great solvent.

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14. Consider coffee to which you have added sugar.

- Which is the solvent?

\_\_\_\_\_

- Which is the solute?

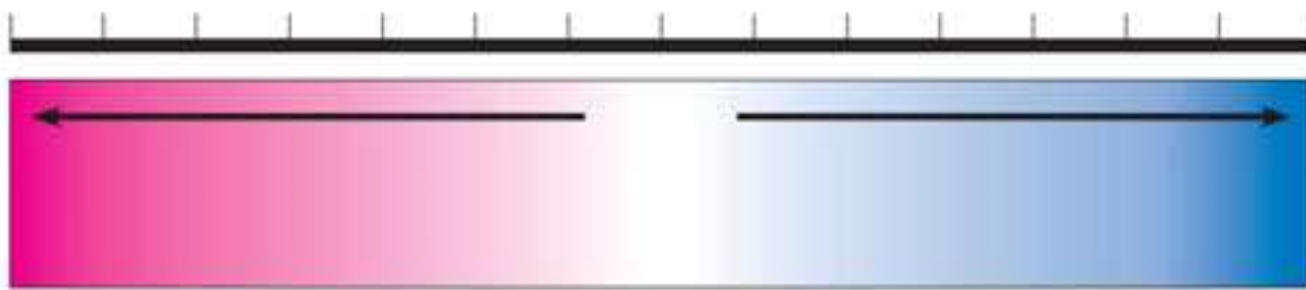
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15. Even a slight change in pH can be harmful! How do buffers moderate pH change?

\_\_\_\_\_

\_\_\_\_\_

16. On the pH chart, label pH 1–14. Label neutral, acid, base. Indicate the locations of pure water, urine, gastric juice, and bleach.



17. Make an electron distribution diagram of carbon in the box to the right. Use your diagram to answer the following bulleted questions.

- How many valence electrons does carbon have?

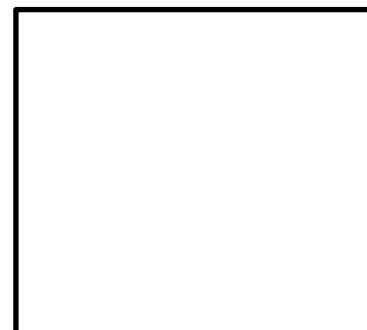
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- How many bonds can carbon form?

\_\_\_\_\_

- What type of bonds does it form with other elements?

\_\_\_\_\_



18. Carbon chains form skeletons. List here the types of skeletons that can be formed.

\_\_\_\_\_

\_\_\_\_\_

19. What is a hydrocarbon? Are hydrocarbons hydrophobic or hydrophilic?

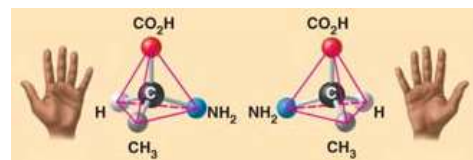
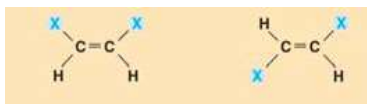
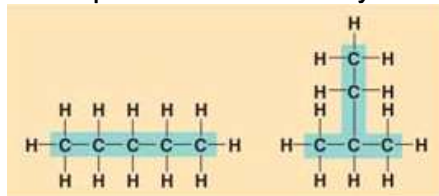
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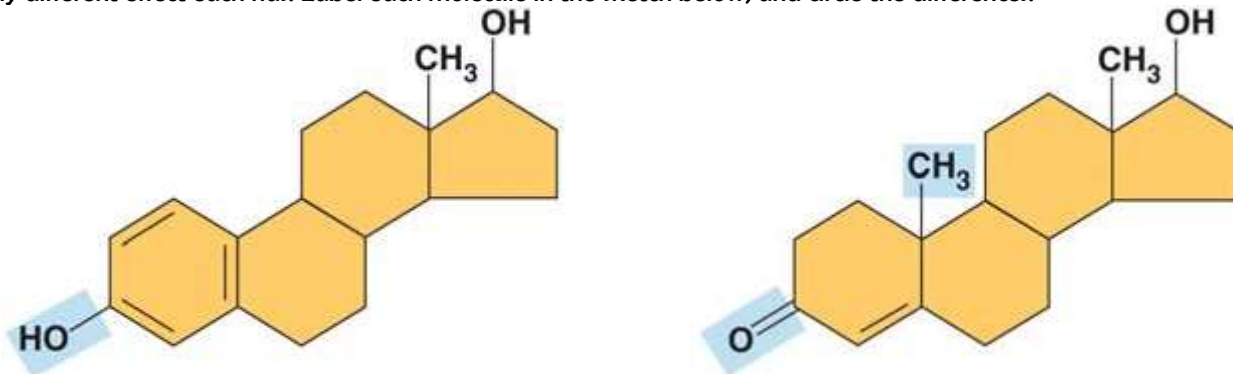
20. In chemistry you learned what an isotope is. Students often confuse this word with isomer, please define each term here and give an example.

	Definition	Example
<i>ISOTOPE</i>		
<i>ISOMER</i>		

21. Use the pictures below to identify the three types of isomers. Write your answers in the line below each picture.



22. Change the structure, change the function. You see this in enantiomers, you will see it in proteins and enzymes, and now we are going to look at testosterone and estradiol. Notice how similar these two molecules are, and yet you know what a vastly different effect each has. Label each molecule in the sketch below, and circle the differences.



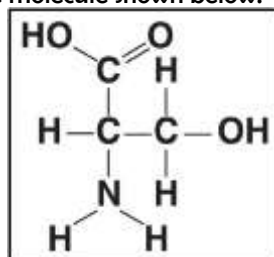
23. There are seven functional groups. Complete the following chart.

	Hydroxyl	Carbonyl	Carboxyl	Amino	Sulfhydryl	Phosphate	Methyl
Structure							
Example							
Functional Properties							

24. Using the functional groups in the chart you filled in above, answer the following prompts:

- \_\_\_\_\_:  $\text{-NH}_2$
- \_\_\_\_\_:  $\text{CH}_3$
- \_\_\_\_\_: Is always polar
- \_\_\_\_\_: Has acidic properties
- \_\_\_\_\_: Key component of ATP
- \_\_\_\_\_: Can affect gene expression
- \_\_\_\_\_: Determines the two groups of sugars
- \_\_\_\_\_: Can form cross-links that stabilize protein structure
- \_\_\_\_\_:  $\text{-COOH}$
- \_\_\_\_\_: Acts as a base

25. Circle and identify three functional groups in the molecule shown below.



26. The large molecules of all living things fall into just four main classes. Name them.

a. \_\_\_\_\_

c. \_\_\_\_\_

b. \_\_\_\_\_

d. \_\_\_\_\_

27. Define macromolecule.

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28. List the three classes that are called macromolecules.

a. \_\_\_\_\_

c. \_\_\_\_\_

b. \_\_\_\_\_

29. What is a polymer?

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30. What is a monomer?

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31. Monomers are connected in what type of reaction? What occurs in this reaction?

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32. Large molecules (polymers) are converted to monomers in what type of reaction?

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33. What are the monomers of all carbohydrates?

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34. Why can you not digest cellulose? What organisms can?

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35. Lipids include fats, waxes, oils, phospholipids, and steroids. What characteristic do all lipids share?

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36. What are the building blocks of fats?

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37. Draw a fatty acid chain that is 8 carbons long and is unsaturated. Circle the element in your chain that makes it unsaturated, and explain what this means.

38. Name two saturated fats.

a. \_\_\_\_\_

b. \_\_\_\_\_

39. Name two unsaturated fats.

a. \_\_\_\_\_

b. \_\_\_\_\_

40. Why are many unsaturated fats liquid at room temperature?

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41. List four important functions of fats.

- a. 

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- b. 

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- c. 

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- d. 

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42. Sketch the phospholipid bilayer structure of a plasma membrane. Label the hydrophilic heads, hydrophobic tails, and location of water.

43. Why are the tails all located in the interior?

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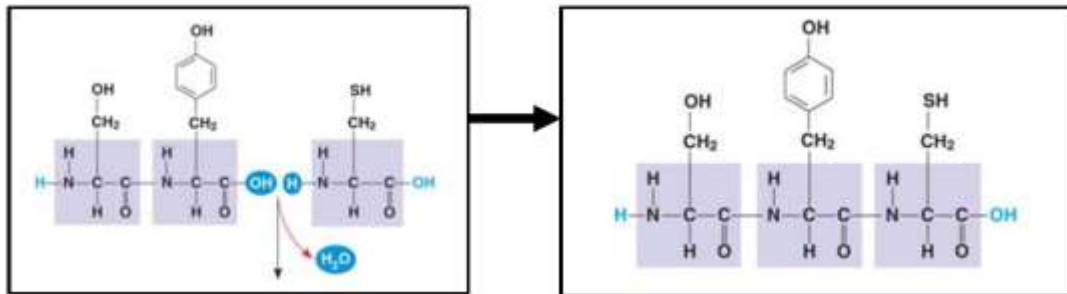
44. What are other examples of steroids?

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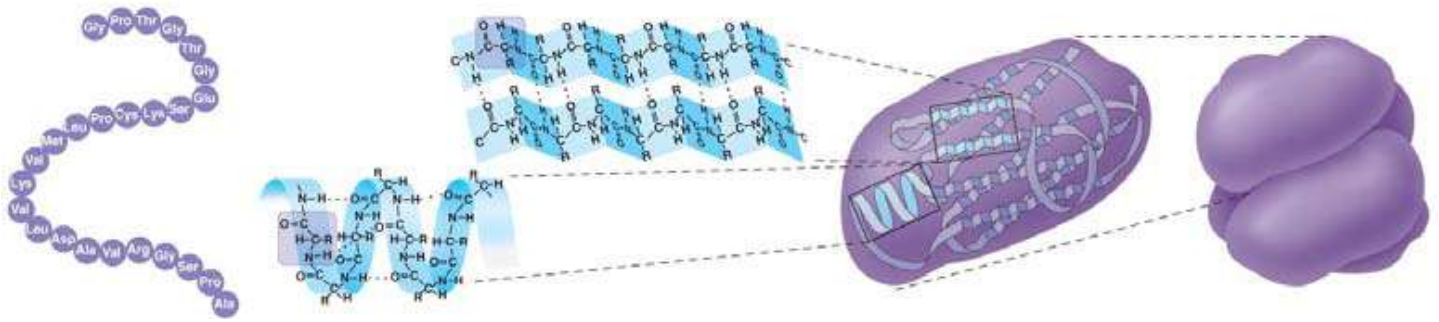
45. Label the terms dipeptide, polypeptide and peptide bond on the diagrams below.



46. There are four levels of protein structure. Summarize each level in the following table.

Level	Explanation	Example
Primary		
Secondary		
Tertiary		
Quaternary		

47. Label each of the levels of protein structure on this figure.



48. Besides mutation, which changes the primary structure of a protein, protein structure can be changed by denaturation.

- Define denaturation

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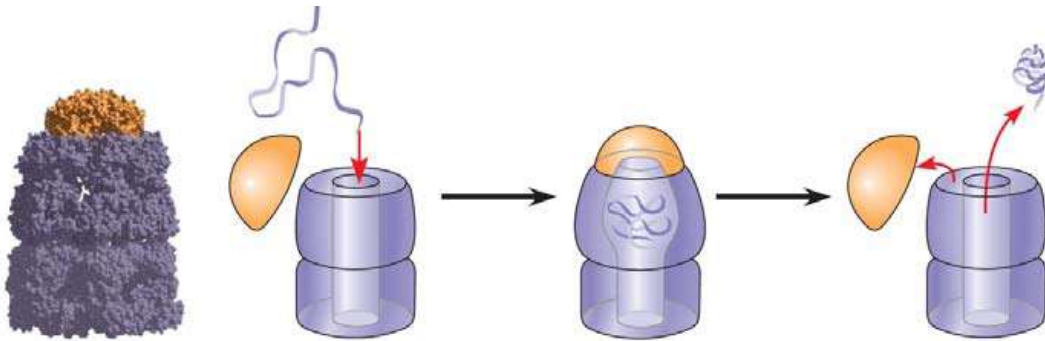


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- List three ways a protein may become denatured.

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

49. Chaperonins assist in the proper folding of proteins. Annotate this figure to explain the process.



50. Notice that there are five nitrogen bases.

- Which four are found in DNA?

- \_\_\_\_\_
- \_\_\_\_\_

- \_\_\_\_\_
- \_\_\_\_\_

- Which four are found in RNA?

- \_\_\_\_\_
- \_\_\_\_\_

- \_\_\_\_\_
- \_\_\_\_\_

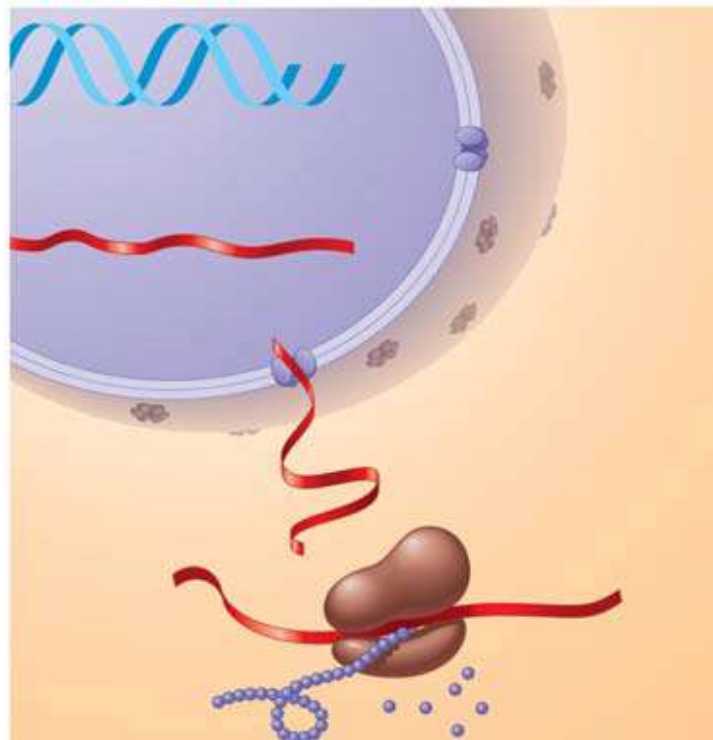
51. How do ribose and deoxyribose sugars differ?

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52. The flow of genetic information is from DNA → RNA → protein. Use the figure below to explain the process. Label the nucleus, DNA, mRNA, ribosome, and amino acids.



53. What are the three components of a nucleotide?

- a. \_\_\_\_\_
- b. \_\_\_\_\_

c. \_\_\_\_\_

54. What two molecules make up the sides of the DNA ladder?

- a. \_\_\_\_\_

b. \_\_\_\_\_

55. What molecules make up the rungs of the DNA ladder?

- c. \_\_\_\_\_

56. For the DNA nucleotides listed below, name the complementary base.

- a. Adenine - \_\_\_\_\_
- b. Guanine - \_\_\_\_\_

- c. Thymine - \_\_\_\_\_
- d. Cytosine - \_\_\_\_\_

57. For the RNA nucleotides listed below, name the complementary base:

- a. Adenine - \_\_\_\_\_
- b. Guanine - \_\_\_\_\_

- c. Uracil - \_\_\_\_\_
- d. Cytosine - \_\_\_\_\_

**AP Biology Summer Assignment Rubric**

Exceeds Standard	Meets Standard	Approaches Standard	Does Not Meet Standard
All questions in the AP Biology Summer Assignment are completed and correct.	All questions in the AP Biology Summer Assignment completed. One or two answers are incorrect.	All questions in the AP Biology Summer Assignment is at least 75% complete. or More than a few answers are incorrect.	All questions in the AP Biology Summer Assignment is less than 75% complete.