

Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

**AP: CHAPTER 2 & 3**  
**CHEMICAL CONTEXT OF LIFE & WATER**

1. What are the most common elements in the human?

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2. Helium has an atomic number of 2 and atomic mass of 4. Explain.

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3. Define isotope and give some examples.

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4. How are isotopes used in biology?

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5. What happens when electrons change levels?

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Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

6. What is the significance of valence numbers?

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7. Why do atoms form covalent vs. ionic bonds?

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8. How do non-polar covalent bonds differ from polar covalent bonds?

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9. What is a hydrogen bond? How does it form and how is it different from a covalent bond?

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10. Sketch a few molecules of water, indicate their polarity, and where H bonds form.

Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

11. Why is H bonding so important to water's properties?

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12. List the "special" properties of water and give an example of why the property may be important to living things.

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

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

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

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

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Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

**AP: CHAPTER 4**  
**CARBON & THE MOLECULAR DIVERSITY OF LIFE**

1. Define organic chemistry.

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2. What are the major groups of organic compounds studied in biology?

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3. Describe some of the shapes of carbon skeletons.

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4. Define the following:

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

b. Geometric isotopes \_\_\_\_\_  
\_\_\_\_\_

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

Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

5. Why are enantiomers of biological interest?

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6. What is the significance of functional groups?

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7. For each of the functional groups, complete the chart:

Group	Formula	Comments
Hydroxyl		
Carbonyl		aldehyde
Carbonyl		ketone
Carboxyl		
Amino		
Sulfhydryl		
Phosphate		

Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

**AP: CHAPTER 5A**  
**MACROMOLECULES**

1. Define the following:

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

\_\_\_\_\_

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

\_\_\_\_\_

c. condensation reaction \_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

2. Which foods do you think will enter the blood the quickest? Why?

\_\_\_\_\_

\_\_\_\_\_

3. What are the general roles of carbohydrates? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. List some monosaccharides with their molecular formulas.

\_\_\_\_\_

\_\_\_\_\_

Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

5. Double sugars are called \_\_\_\_\_  
List the monosaccharides that form each:

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

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

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

6. Polymers of sugars form \_\_\_\_\_

7. Which forms of polysaccharide is best for each function:

a. Strength of structure \_\_\_\_\_

b. Storage and sugar release \_\_\_\_\_

c. What theme is this addressing? \_\_\_\_\_

8. How does the alpha differ from the beta form of glucose and why is it significant to animals?

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

9. How do the role and structure of the following polysaccharides compare?

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

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

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

10. Ninety percent of Asians, 75% of African-Americans, and a much smaller percent of northern Europeans are lactose intolerant. Why do you suppose we see this pattern?

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

Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

**AP: CHAPTER 5B**  
**MACROMOLECULES**

1. What is the characteristic common to lipids? \_\_\_\_\_

\_\_\_\_\_

2. Lipids are synthesized by the chemical reaction \_\_\_\_\_

and broken down by the reaction \_\_\_\_\_

3. What makes fats hydrophobic? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. State at least two differences between saturated and unsaturated fats.

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

\_\_\_\_\_

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

\_\_\_\_\_

5. How do phospholipids interact in an aqueous solution?

\_\_\_\_\_

\_\_\_\_\_

6. Make a diagram of phospholipid interactions that form membranes.



Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

7. Sketch the common building block of steroids.

8. List several functions of proteins.

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9. What are the three properties used to classify amino acids?

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10. Sketch two amino acids side-by-side, on one of them label the functional groups, then show how the two can be joined together.

11. What determines the primary structure of a protein? \_\_\_\_\_

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Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

12. Describe the four levels of protein structure:

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

\_\_\_\_\_

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

\_\_\_\_\_

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

\_\_\_\_\_

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

\_\_\_\_\_

13. What happens to a protein during denaturation? \_\_\_\_\_

\_\_\_\_\_

14. What are the building blocks of nucleic acids? \_\_\_\_\_

15. Briefly describe two functions of DNA in the cell.

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

\_\_\_\_\_

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

\_\_\_\_\_

Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

### AP: CHAPTER 6: METABOLISM & ENZYMES

1. Define the following terms:

a. Catabolic pathway \_\_\_\_\_

b. Anabolic pathway \_\_\_\_\_

c. Kinetic energy \_\_\_\_\_

d. Potential energy \_\_\_\_\_

2. The First Law of Thermodynamics is the principle of... \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. The Second Law of Thermodynamics involves changes in... \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. What is meant by a change in free energy? \_\_\_\_\_

\_\_\_\_\_

5. Compare reactions that are...

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

\_\_\_\_\_

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

\_\_\_\_\_

Name \_\_\_\_\_

6. Sketch the ATP cycle:

7. How does ATP "couple reactions"? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. Sketch the profile of an exergonic reaction.

9. How do enzymes affect the energy profile? \_\_\_\_\_  
\_\_\_\_\_

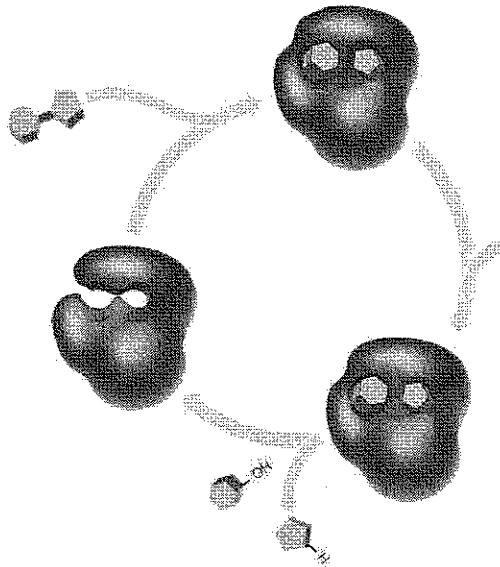
10. Define activation energy. \_\_\_\_\_  
\_\_\_\_\_

11. Why are enzymes said to be specific? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

12. List factors that influence the rate of enzyme reactions. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Name \_\_\_\_\_

13. Label the diagram of the catalytic enzyme cycle.



14. How do competitive and noncompetitive inhibitors differ in their enzyme interactions?

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15. What happens during allosteric regulation? \_\_\_\_\_

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16. Describe feedback inhibition. \_\_\_\_\_

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17. Define enzyme cooperativity. \_\_\_\_\_

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