

- **PHYSICALLY PRINT OUT** this PDF and **HANDWRITE** (with a black or blue pen) your answers directly on this PDF. Typed or digitally-written work is **not** accepted. Do **not** answer questions on separate paper.
- **Importantly, study guides are NOT GROUP PROJECTS!!!** You, and you alone, are to answer the questions as you **read** your assigned textbook. You are **not** to share answers with other students. You are **not** to copy any answers from any other source, including the internet.
- **Get in the habit of writing LEGIBLY, neatly, and in a medium-sized font.** AP essay readers and I will skip grading anything that cannot be easily read so start perfecting your handwriting, and don't write so large you can't add all the relevant details and key elaborations in the space provided.
- **SCAN physical documents in color and with good resolution. Then, upload your final work as PDFs to Archie.** Avoid uploading dark, shaded, washed-out, sideways, or upside-down scans of homework. Keep completed physical study guides organized in your biology binder to use as future study and review tools.
- **READ FOR UNDERSTANDING and not merely to complete an assignment.** *First*, read a section quickly to get an overview of the topic covered. Then, read it a **second** time slowly, paraphrasing each paragraph **out loud** and analyzing every figure. Finally, read it a **third** time as you answer the study guide questions if assigned and start building your memory. Try to write answers out in your own words, when possible, and try to purposefully and accurately use all new terminology introduced.

KEY CONCEPTS

- **Macromolecules are polymers, built from monomers.**
1. What are the four main classes of **large biological molecules**? Place an asterisk in the box of the three classes of large biomolecules that are considered also * **macromolecules** * (= molecules, which are comparatively huge and are made up of numerous small **repeating** molecular units covalently bonded together, forming a **polymer**)
 2. Define the following terms.
 - a. Polymer
 - b. Monomer (**FYI: Though used to build large biomolecules, monomers do have functions on their own**)
 3.
 - a. What do we mean by the word **polymerization**?
 - b. Like most chemical reactions in cells, this process is assisted by enzymes. What is an **enzyme**?
 4.
 - a. Why does a cell conduct a **Dehydration (Synthesis) Reaction**?
 - b. Provide a brief description of what happens during a **Dehydration Synthesis Reaction**. *Be specific about which atoms from which molecules are involved.*

c. Why does a cell conduct a **Hydrolysis Reaction**?

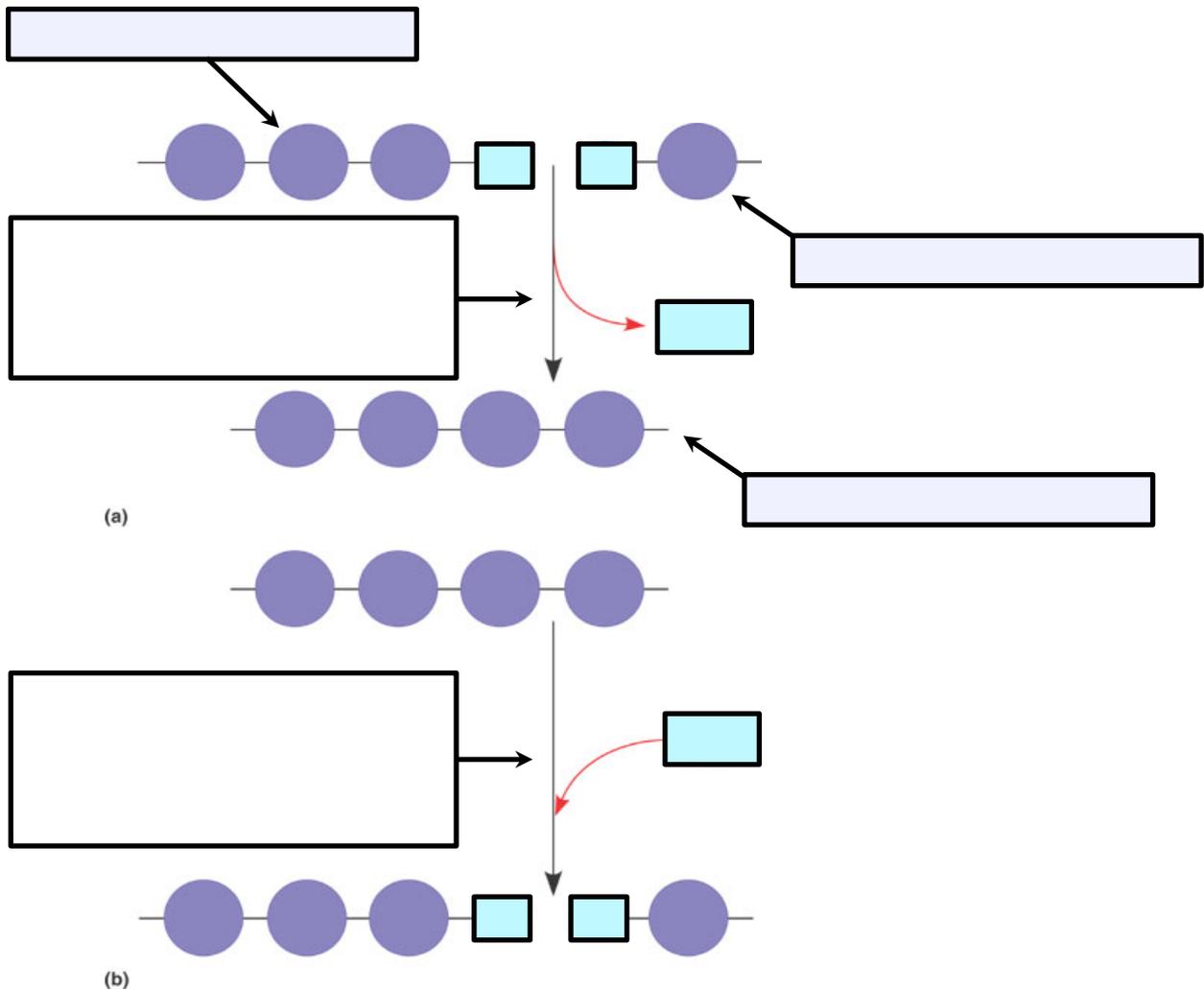
d. Provide a brief description of what happens during a **Hydrolysis Reaction**. *Be specific about which atoms from which molecules are involved.*

5. The Greek root words of “hydrolysis” will be used many times to form other words you will learn this year. What does each root word mean?

a. **Hydro** =

b. **Lysis** =

6. Label the diagram below. Identify the covalently bonded H & OH's, water molecules, monomer, polymer, condensation reaction (a dehydration synthesis reaction in this case), and a hydrolysis reaction.



7. a. Using figure 5.2 as your guide, draw out a **generic polymer made up of 8 monomers** covalently linked below.
- b. In your illustration above, indicate (**with arrows**) the locations where the atoms of hydrolyzed water molecules (OH & H) would have to be added in order to separate the covalently-bonded polymer into its individual monomers.
- c. **How many total water molecules would be needed to accomplish the full hydrolysis** of this polymer of 8 monomers?
- d. **How many water molecules would form as a product** in a chemical reaction in which 20 monomers are linked together into one polymer through dehydration synthesis reactions? **Why?**
8. Our Earth houses a great diversity of life, yet all of life's cells are made up of water, inorganic ions and molecules, and organic (carbon-based) biomolecules (i.e. carbohydrates, lipids, proteins, and nucleic acids). When we focus on biomolecules, all of them are only made up of a few tens of different monomers collectively. Yet, especially DNA and proteins, show a tremendous variety within and between species. What is the **key to making such a diversity of biomolecules from relatively few monomers?**
9. **What If?** If you eat a piece of fish, what reactions - regarding the proteins - must occur for the amino acid monomers in the **fish's proteins** to be absorbed into your body and then be converted into **human protein** in your body cells? State the reactions in the correct order.

(Check your answer by going to the **Ch.5.1 Concept Check Question #3** answer in Appendix A)