**CHEMISTRY REVIEW (cont’d)**

| **HAPS Topic** | **Learning Outcome** | **Text** | **HTHS 1110** |
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| Organic compounds | 1. Define the term organic molecule. | 2.5 | Module 3 Objective 1. Define the term “organic molecule.” |
| 1. Explain the relationship between monomers and polymers. | 2.5 | Module 3 Objective 3. Define the terms: monomer, polymer. |
| 1. Define and give examples of dehydration synthesis and hydrolysis reactions. | 2.3 | Module 3 Objective 5. Define dehydration synthesis and hydrolysis reactions. Give examples of each. |
| 1. With respect to carbohydrates, proteins, lipids and nucleic acids: |  | Module 3 Objective 2. State the properties that make a molecule a carbohydrate, protein, lipid, or nucleic acid. Know the general molecular structure of each.  Module 3 Objective 3. Define the terms: monomer, polymer.  Module 3 Objective 4. For carbohydrates in the human body:  a. Describe the physiological and anatomical roles  b. Identify monomers and polymers  c. Give biologically relevant examples  d. Identify dietary sources.  Module 3 Objective 6. For lipids in the human body:  a. Describe the physiological and anatomical roles  b. Identify monomers and polymers  c. Give biologically relevant examples  d. Identify dietary sources.  Module 3 Objective 7. For proteins in the human body:  a. Describe the physiological and anatomical roles  b. Identify monomers and polymers  c. Give biologically relevant examples  d. Identify dietary sources.  Module 3 Objective 10. For nucleic acids in the human body:  a. Describe the physiological and anatomical roles  b. Identify monomers and polymers  c. Give biologically relevant examples. |
| * 1. Identify the monomers and polymers. | 2.5 |
| * 1. Compare and contrast general molecular structure. | 2.5 |
| * 1. Provide specific examples. |  |
| * 1. Identify dietary sources. |  |
| * 1. Discuss physiological and structural roles in the human body. | 2.5 |
| 1. Describe the four levels of protein structure and discuss the importance of protein shape for protein function. | 2.5 | Module 3 Objective 8. Describe the four levels of protein structure and discuss the concept of structure-function relationships in proteins. |
| 1. Demonstrate factors that affect enzyme activity, including denaturation, and interpret graphs showing the effects of various factors on the rate of enzyme-catalyzed reactions. |  | Module 3 Objective 9. Define an enzyme. Demonstrate factors that affect enzyme activity, including denaturation, and interpret graphs showing the effects of various factors on the rate of enzyme-catalyzed reactions. |
| Energy transfer using ATP | Describe the generalized reversible reaction for release of energy from ATP and explain the role of ATP in the cell. | 2.5 | Module 3 Objective 11. Know the biological role of adenosine triphosphate (ATP). Describe how ATP is used to produce cellular energy. |

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| Intracellular organization of  nucleus & cytoplasm | 1. Identify the three main parts of a cell, and list the general functions of each. | 3.1 |  |
| 1. Explain how cytoplasm and cytosol are different. | 3.1  3.4 |  |
| Membrane structure & function | 1. Describe how lipids are distributed in a cell membrane, and explain their functions. | 3.2 |  |
| 1. Describe how carbohydrates are distributed in a cell membrane, and explain their functions. | 3.2 |  |
| 1. Describe how proteins are distributed in a cell membrane, and explain their functions. | 3.2 |  |
| Mechanisms for movement of materials across cell membranes | 1. With respect to the following membrane transport processes — simple diffusion, facilitated diffusion, osmosis, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis & filtration: |  |  |
| * 1. State the type of material moving in each process. | 3.3 |  |
| * 1. Describe the mechanism by which movement of material occurs in each process. | 3.3 |  |
| * 1. Discuss the energy requirements and, if applicable, the sources of energy for each process. | 3.3 |  |
| * 1. Give examples of each process in the human body. | 3.3 |  |
| 1. Describe the effects of hypertonic, isotonic, and hypotonicconditionson cells. | 3.3 |  |
| 1. Demonstrate various cell transport processes and, given appropriate information, predict the outcomes of these demonstrations. |  |  |
| Organelles | 1. Define the term organelle. | 3.4 |  |
| 1. For each different type of organelle associated with human cells: |  |  |
| 1. Identify the organelle. | 3.4 |  |
| 1. Describe the structure of the organelle. | 3.4 |  |
| 1. Describe the function of the organelle. | 3.4, 3.5 |  |
| Protein synthesis | 1. Define the terms genetic code, transcription and translation. | 3.6 |  |
| 1. Explain how and why RNA is synthesized. | 3.6 |  |
| 1. Explain the roles of tRNA, mRNA, and rRNA in protein synthesis. | 3.6 |  |
| Cellular respiration (introduction) | 1. Define the term cellular respiration. | 25.1 |  |
| 1. With respect to glycolysis, the Krebs (citric acid or TCA) cycle, and the electron transport chain: compare and contrast energy input, efficiency of energy production, oxygen use, by-products and cellular location. | 25.1  25.3 |  |
| Somatic cell division | 1. Referring to a generalized cell cycle, including interphase and the stages of mitosis: |  |  |
| 1. Describe the events that take place in each stage. | 3.7 |  |
| 1. Identify cells that are in each stage. | 3.7 |  |
| 1. Analyze the functional significance of each stage. | 3.7 |  |
| 1. Distinguish between mitosis and cytokinesis. | 3.7 |  |
| 1. Describe DNA replication. | 3.7 |  |
| 1. Analyze the interrelationships among chromatin, chromosomes and chromatids. |  |  |
| 1. Give examples of cell types in the body that divide by mitosis and examples of circumstances in the body that require mitotic cell division. |  |  |
| Reproductive cell division | 1. Describe the events that take place in each stage of meiosis I and meiosis II. | 3.7 |  |
| 1. Identify cells that are in each stage of meiosis I and meiosis II. | 3.7 |  |
| 1. Compare and contrast the general features of meiosis I and meiosis II. | 3.7 |  |
| 1. Compare and contrast the processes of mitosis and meiosis. | 3.7 |  |
| 1. Give examples of cell types in the body that divide by meiosis and examples of circumstances in the body that require meiotic cell division. | 28.1  28.2 |  |
| Application of homeostatic mechanisms | Provide specific examples to demonstrate how individual cells respond to their environment (e.g., in terms of organelle function, transport processes, protein synthesis, or regulation of cell cycle) in order to maintain homeostasis in the body. |  |  |
| Predictions related to homeostatic imbalance,  including disease states & disorders | 1. Predict factors or situations that could disrupt organelle function, transport processes, protein synthesis, or the cell cycle. |  |  |
| 1. Predict the types of problems that would occur if the cells could not maintain homeostasis due to abnormalities in organelle function, transport processes, protein synthesis, or the cell cycle. |  |  |