

Mrs. Furlong's 2009-2010 Mid-Term Study Guide-HONORS BIOLOGY

Chapter 1: Biology and You

▪ Themes of Biology

- Relate the seven properties of life to a living organism.
- Describe seven themes that can help you organize what you learn about biology.
- Identify the tiny structures that make up all living organisms.
- Differentiate between reproduction and heredity and between metabolism and homeostasis.

▪ Biology in Your World

- Evaluate the impact of scientific research on the environment.
- Evaluate the impact of scientific research on society with respect to increasing food supplies.
- Explain the primary task of the Human Genome Project.
- Describe the contributions of scientists in fighting AIDS and cancer.
- Define the term *gene therapy*.

▪ Scientific Processes

- Describe the stages common to scientific investigations.
- Distinguish between forming a hypothesis and making a prediction.
- Differentiate a control group from an experimental group and an independent variable from a dependant variable.
- Define the word *theory* as used by a scientist.



Chapter 2: Chemistry of Life

▪ Nature of Matter

- Differentiate between atoms and elements.
- Analyze how compounds are formed.
- Distinguish between covalent bonds, hydrogen bonds, and ionic bonds.

▪ Water and Solutions

- Analyze the properties of water.
- Describe how water dissolves substances.
- Distinguish between acids and bases.

▪ Chemistry of Cells

- Summarize the characteristics of organic compounds.
- Compare the structures and function of different types of biomolecules.
- Describe the compounds of DNA and RNA.
- State the main role of ATP in cells.

▪ Energy and Chemical Reactions

- Evaluate the importance of energy to living things.
- Relate energy and chemical reactions.
- Describe the role of enzymes in chemical reactions.
- Identify the effect of enzymes on food molecules.

Chapter 3: Cell Structure

▪ Cell Features

- List the three parts of the cell theory.
- Determine why cells must be relatively small.
- Compare the structure of prokaryotic cells with that of eukaryotic cells.
- Describe the structure of cell membranes.

- **Cell Organelles**
 - Describe the role of the nucleus in cell activities.
 - Analyze the role of internal membranes in protein production.
 - Summarize the importance of mitochondria in eukaryotic cells.
 - Identify three structures in plant cells that are absent from animal cells.
- **Cells and Their Environment**
 - Relate concentration gradients, diffusion, and equilibrium.
 - Predict the direction of water movement into and out of cells.
 - Describe the importance of ion channels in passive transport.
 - Identify the role of carrier proteins in facilitated diffusion.
- **Active Transport**
 - Compare active transport with passive transport.
 - Describe the importance of the sodium-potassium pump.
 - Distinguish between endocytosis and exocytosis.
 - Identify three ways that receptor proteins can change the activity of a cell.

Chapter 6 Chromosomes and Cell Reproduction

- **Chromosomes**
 - Identify four examples of cell division in eukaryotes and one example in prokaryotes.
 - Differentiate between a gene, a DNA molecule, a chromosome, and a chromatid.
- **The Cell Cycle**
 - Identify the major events that characterize each of the five phases of the cell cycle.
 - Describe how the cell cycle is controlled in eukaryotic cells.
 - Relate the role of the cell cycle to the onset of cancer.
- **Mitosis and Cytokinesis**
 - Describe the structure and function of the spindle during mitosis.
 - Summarize the events of the four stages of mitosis.
 - Differentiate cytokinesis in animal and plant cells.

Chapter 9 DNA: The Genetic Material

- **Identifying the Genetic Material**
 - Relate Griffith's conclusions to the observations he made during the transformation experiments.
 - Describe how Avery's experiment supplied evidence that DNA, and not protein, is the genetic material.
 - Describe the contributions of Hershey and Chase to the understanding that DNA is the genetic material.
- **The Structure of DNA**
 - Describe the three parts of a DNA nucleotide.
 - Relate the base-pairing rules to the structure of DNA.
 - Describe the two pieces of information from other scientists that enabled James Watson and Francis Crick to discover the double-helical structure of DNA.
 - Explain why the two strands of the double helix are described as complementary.
- **The Replication of DNA**
 - Explain the two roles that enzymes play in DNA replication (as illustrated in Figure 9).
 - Explain the relationship between DNA polymerases and mutations.
 - State the effect of multiple replication forks on the speed of replication in eukaryotes.

Chapter 10 How Proteins Are Made

- **From Genes to Proteins**
 - Compare the structure of RNA with that of DNA.
 - Explain how RNA is made during transcription.
 - Relate the role of codons to the sequence of amino acids that results after translation.
 - Compare the roles of the three different types of RNA during translation.
 - Understand the evolutionary significance of the genetic code.
- **Gene Regulation and Structure**
 - Understand the role of transcription factors and enhancers in eukaryotic gene expression.
 - Differentiate between exons and introns.
 - Evaluate the three ways that point mutations can alter genetic material.

Chapter 12 History of Life on Earth

- **How Did Life Begin?**
 - Summarize how radioisotopes can be used in determining Earth's age.
 - Compare two models that describe how the chemicals of life originated.
 - Describe how cellular organization might have begun.
 - Recognize the importance that a mechanism for heredity has to the development of life.
- **The Evolution of Cellular Life**
 - Distinguish between the two groups of prokaryotes.
 - Describe the evolution of eukaryotes.
 - Summarize how mass extinctions have affected the evolution of life on Earth.
- **Life Invaded the Land**
 - Relate the development of ozone to the adaptation of life to the land.
 - Identify the first multicellular organisms to live on land.
 - List the first vertebrates to leave the oceans.

Chapter 13 The Theory of Evolution

- **The Theory of Evolution by Natural Selection**
 - Identify several observations that led Darwin to conclude that species evolve.
 - Relate the process of natural selection to its outcome.
 - Summarize the main points of Darwin's theory of evolution by natural selection.
 - Differentiate between the gradualism and punctuated equilibrium models of evolution (Butterfly picture)
- **Evidence of Evolution**
 - Relate how the fossil record provides evidence that evolution has occurred.
 - Understand how comparing the amino acid sequence of a protein can provide evidence that evolution has taken place.
 - Describe how comparing the anatomy of living species provides evidence of evolution.
 - Understand the difference between homologous and vestigial structures.
 - Understand the contributions of Malthus and Lamarck to the theory of evolution.
- **Examples of Evolution**
 - Identify four elements in the process of natural selection.
 - Describe how natural selection has affected the bacteria that cause tuberculosis.
 - Relate natural selection to the beak size of finches.
 - Describe how speciation takes place.
 - Understand Lack's and the Grant's contributions to the study of species formation.

If you have any tests or quizzes, use them to review. Notecard quizzes will be posted on Edline. I STRONGLY recommend studying from my notes packets and old tests.