AP Biology Mid Term Study Guide

*This document is a “guide” of some of the key topics. You are responsible for all information covered in this class.*

1. Water (Chapter 3)
   1. Properties of water: polarity, cohesion, adhesion, etc.
   2. The pH Scale
2. Carbon (Chapter 4)
   1. Functional groups
3. Macromolecules (Chapter 5)
   1. Monomers and polymers for carbohydrates, lipids, proteins, nucleic acids
   2. Structure and function
4. Metabolism (chapter 6)
   1. Endergonic vs. exergonic reactions
   2. Function and structure of enzymes
   3. Allosteric regulation/ feedback inhibition
5. Cells (Chapter 7)
   1. Differences between prokaryotic and eukaryotic cells and plant and animal cells.
   2. Recognize the major cell organelles, structure and function.
   3. Parts of the endomembrane system and how this system functions.
6. Membranes (Chapter 8)
   1. Fluid-mosaic model of the cell membrane.
   2. Structure and properties of phospholipids, functions of membrane proteins.
   3. Process of diffusion and osmosis
   4. What happens to plant and animal cells when they are placed in isotonic, hypotonic and hypertonic solutions?
   5. Endocytosis v. Exocytosis
7. Cellular Respiration (Chapter 9)
   1. Role of ATP, ATP structure and the ATP/ADP cycle.
   2. Difference between oxidation and reduction.
   3. Significance and formula of cellular respiration.
   4. Energy release from sugar in a series of chemical reactions and conversion to ATP.
   5. Products and reactants of Glycolysis, Krebs Cycle, Electron Transport System
   6. Aerobic v. anaerobic respiration
8. Photosynthesis (Chapter 10)
   1. Overall formula for photosynthesis.
   2. Role of chlorophyll in photosynthesis.
   3. How do the photosystems capture light energy and convert it into chemical energy.
   4. How does the Calvin Cycle use chemical energy and CO2 to make sugar?
   5. Where do each of the following takes place, what goes into each, and what products are released: Light Reactions and the Calvin Cycle
9. Cell Signaling (Chapter 11)
   1. Paracrine v. Synaptic signaling
   2. Reception, Transduction and Response
10. Cell Division (Chapter 12)
    1. Functions of cell division**.**
    2. Eukaryotic chromosome structure.
    3. Cell cycle; phases and what happens in each phase.
    4. Define mitosis.
    5. Names of the stages of mitosis and what happens in each stage.
    6. How does cytokinesis differ in plant and animal cells.
    7. How does the cell-cycle control system regulate cell division in mammalian cells?
11. Meiosis (Chapter 13)
    1. Purpose/function of meiosis.
    2. Haploid v. Diploid
    3. Stages of meiosis and what happens in each stage.
    4. Meiosis and genetic variation (independent assortment and crossing over)
12. Mendel (Chapter 14)
    1. Chromosome theory of inheritance.
    2. Mendel’s Laws: Segregation and Independent Assortment
    3. Probability and genetics (Rule of Multiplication and Rule of Addition)
    4. Basic genetic terminology. (Gene/allele, genotype/phenotype, dominant/recessive, homozygous/heterozygous)
    5. Crosses: Monohybrid, Dihybrid, Test cross, Incomplete Dominance, Sex-linked, Multiple alleles
    6. Pedigrees.
    7. Epistasis and gene expression.
    8. Expression of polygenetic traits
    9. Environmental affect on the expression of genes.
13. Chromosomes (Chapter 15)
    1. Linked genes.
    2. Crossover frequencies and relative gene maps.
    3. Sex chromosomes and sex determination.
    4. X-inactivation in females.
    5. Errors during meiosis (nondisjunction) and abnormal chromosome numbers.
14. Molecular basis DNA (Chapter 16)
    1. Know nucleotide structure, DNA structure, the four DNA bases and base pairing.
    2. Know how DNA is replicated.
    3. Antiparallel structure (leading and lagging strand)
    4. Telomeres and telomerase
15. Gene to protein (Chapter 17)
    1. Roles of DNA, mRNA, tRNA and the ribosome in protein synthesis.
    2. Synthesis and processing of RNA - Transcription
    3. Translation, converting genes into a polypeptide.
    4. mRNA modification into eukaryotic cells (RNA processing).
    5. Know how DNA mutations affect protein synthesis (point, insertions & deletions).
16. Microbial Models (Chapter 18)
    1. Basic structure of a virus.
    2. Viral infection of a host cell and how new viruses are assembled.
    3. Lytic v. Lysogenic life cycle
    4. Bacterial plasmids.
    5. Bacterial exchange of genetic material (transformation, transduction, conjugation).
    6. Operon theory.
17. Eukaryotic Genome Expression (Chapter 19)
    1. DNA is “packing” into a eukaryotic chromosome.
    2. Why is there a difference in the amount of DNA in eukaryotes v. prokaryotes.
    3. Eukaryotic gene regulation
18. DNA Technology (Chapter 20)
    1. Cloned genes by bacterial plasmids.
    2. How do restriction enzymes work to cut DNA?
    3. Recombinant DNA
    4. Gel electrophoresis and separation of DNA fragments based on fragment length.
    5. DNA sequencing.