AP Biology Fall Final – Multiple Choice Study Guide

60 – 70 Multiple Choice Questions. There will be calculations/genetics problems included in the multiple choice questions

**Unit 1 - Biochemistry**

1. Why is water polar?
2. Draw 2 water molecules interacting. Label covalent bonds and hydrogen bond.
3. What do the terms neutral, basic, and acidic mean in terms of pH, H+ concentration and OH- concentration?
4. Draw/describe primary, secondary (alpha helices and beta pleated sheets), tertiary, and quaternary structures of proteins.
5. Hydrolysis and dehydration synthesis reactions. How do these relate to anabolic/catabolic reactions, exergonic/endergonic, and entropy?
6. What makes amino acids different from each other?
7. Be able to draw an amino acid and the peptide bond that can form between them.
8. What environmental factors can cause enzymes to denature? What part of proteins structure (primary, secondary, tertiary, quaternary) is breaking down? How does this relate to the rate of an enzymatic reaction?
9. Interpret enzyme graphs (optimal pH/temp, free energy change, catalyzed rxn. Vs. uncatalyzed rxn.

**Unit 2 –Cells, Diffusion/Osmosis, Cell Cycle**

1. What is the endosymbiotic theory and what are 3 pieces of evidence that support it?
2. Compare and contrast diffusion, facilitated diffusion and active transport
3. How do properties of a molecule determine its rate of diffusion?
4. Predict what way water will move given info on concentrations (hypertonic, hypotonic, isotonic vocabulary applied)
5. Water potential problems
6. Surface area to volume ratio calculation and how this relates to cell efficiency
7. 3 steps of cell signaling
8. What are the parts of the cell cycle?
9. How do the terms cyclin, cdk, protein kinase, and MPF relate to each other?

**Unit 3 - Photosynthesis and Respiration, Gibbs Free Energy**

1. What is Gibbs Free Energy
2. What is entropy? How does entropy of a the reactants and the products of a reaction compare when a catabolic or anabolic reaction takes place?
3. What are 2 examples of a reaction that has a negative delta G? Exergonic/Catabolic
4. What are 2 examples of a reaction that has a positive delta G? Endergonic/Anabolic
5. How to write a hypothesis in the correct format

Know oxidation and reduction reactions. NADH 🡪 NAD+ (FADH, NADPH)

-which of these is exergonic, which is endergonic?

-which form of the molecule has a higher potential energy?

**Cellular Respiration**

1. How does the structure of the mitochondria (specifically the inner folds) help support the mitochondria’s function?
2. Where do the following reactions take place? Glycolysis, Krebs Cycle, Electron Transport Chain (oxidative phosphorylation).
3. What is the role of O2 in the electron transport chain?
4. What process occurs under anaerobic conditions?
5. How are facilitated diffusion and active transport involved in oxidative phosphorylation? (is diffusion involved?)
6. Interpret a diagram and describe if reactions are catabolic/anabolic and exergonic/endergonic

**Photosynthesis**

1. Why are leaves green (relative light absorption graph)
2. Where does the light-dependent reaction take place?
3. Where does the calvin cycle take place?
4. What are the inputs and outputs of the light dependent and calvin reactions and why are the two processes related? Explain in terms of endergonic/exergonic
5. What is water used for in the light dependent reaction? (what molecule comes out of water)
6. What happens to the CO2 that goes in to the calvin cycle? (what molecule does it become a part of?
7. How do global CO2 levels relate to photosynthesis?

**Unit 4 - Meiosis and Genetics**

1. \*\*Compare and contrast mitosis and meiosis (function, diploid haploid, # daughter cells produces, where do sister chromatids separate/homologous chromosomes separate?
2. Crossing over occurs between what? How does this increase genetic diversity?
3. What are 3 ways that Meiosis increases genetic diversity?
4. Genetics problems
   1. Mendelian
   2. sex-linked
   3. blood typing
   4. incomplete dominance
   5. codominance
   6. chromosome mapping/recombination frequencies
   7. epistasis

**Unit 5**

**Protein synthesis**

1. Compare/contrast amino acids, nucleotides, DNA, protein
2. How do new alleles arise in a population?
3. Be able to figure out amino acid sequences given a template strand of DNA
4. Compare/contrast different mutation types (frameshift, missense, nonsense, silent)
5. Mutation consequences in somatic vs. gametes

**Gene Expression**

1. Compare and contrast inducible versus repressible operons. What are the different parts of the operon and their function?
2. Epigenetics-how does methylation change gene expression?
3. What are HOX genes and what does their protein product do? What are possible consequences of mutations in HOX genes

**DNA, Experiments, Viruses**

1. Know the structure of DNA
   1. Bases: Purines and Pyrimidines
   2. Complementary Base Pairing (Chargoff’s Rule)
   3. Components of Nucleotide
2. Know the details and significance of experiments done by Griffith, Hersey and Chase, and Meselson and Stahl
3. Compare and contrast the West Nile Virus and the HIV life cycles