Name:_____ Date:_____ Period:_____

AP BIOLOGY SPRING 2015 FINAL EXAM REVIEW

This assignment is meant to help you review for your final exam. The exam will cover:

- Cells, Cellular Energetics, and Cell Growth and Division: Chapters 6-13
- Genetics: Chapters 14 and 15
- Gene Expression/Molecular Genetics: Chapters 16-21
- Evolution: Chapters 22-26

This review assignment is a guide to follow as you study, but is not necessarily everything that will be on the exam. You will be asked to define vocabulary, describe theories, explain concepts, and draw processes. The exam will consist of consist of questions similar to our quizzes, labs, and concept overviews throughout the term and will count as 20% of your final grade. Questions will include free response questions and well as some multiple choice. ***Please*** let me know if you have any questions.

Define/Explain/Illustrate/Give examples of the following terms/topics:

Cells, Cellular Energetics, and Cell Growth & Division

- Cell theory
- Prokaryotes vs. eukaryotes
- Organelles, their general structures and functions, and how they differ between plants & animals
- Cell membranes/cell walls, their structures and functions
- Passive vs. active transport; Osmosis
- Hypertonic, hypotonic, isotonic & animal vs. plant cells in each
- Homeostasis in unicellular vs. multicellular organisms
- Metabolism & Free energy
- ADP/ATP and how energy is made
- Signal reception, transduction, and response
- Heterotroph vs. autotroph
- Chlorophyll & other pigments
- Electron carriers
- The equation for photosynthesis and who photosynthesizes
- The steps and locations of photosynthesis and the reactants/products of each step of photosynthesis
- The factors that affect photosynthesis
- The equation for respiration and who respires
- The steps and locations of respiration and the reactants/products of each step of respiration
- The factors that affect respiration
- Aerobic vs. anaerobic & fermentation
- Comparing photosynthesis & respiration and our labs
- SA:V ratios; Problems with growing larger
- Sexual/asexual reproduction
- Cell cycles
- Stages and products of mitosis
- Regulation of cell cycle
- Apoptosis; Cancer
- Diploid/haploid
- Stages and products of meiosis; Gametes
- Independent assortment/crossing over
- Sexual vs. asexual reproduction

Genetics

- Homozygous vs. heterozygous
- Phenotype vs. genotype
- Monohybrid & Dihybrid crosses
- P, F1, & F2
- Incomplete/codominance
- Multiple alleles and polygenic traits
- Sex-linked traits
- Linked genes and gene mapping
- Thomas Hunt Morgan
- Mutations
- Chi-squared

Gene Expression/Molecular Genetics

- Early DNA experiments (Griffith and the mice, Hershey and Chase, transformations)
- The structure of DNA and its base paring rules
- The semi-conservative model of DNA replication
- The enzymes and processes involved in DNA replication
- DNA proofreading
- The central dogma of biology
- Beadle and Tatum's conclusions
- Be able to transcribe and then translate a DNA template strand
- Transcription, its location, and its enzymes (be sure to mention promoters, TATA boxes, polymerases, direction, termination)
- How eukaryotes modify RNA after transcription (introns, exons, 5' cap, poly-A tail, etc.)
- The structures and functions of mRNA, tRNA, rRNA
- The location, process, and enzymes of translation (initiation, start codons, codon recognition, peptide bonding, translocation, stop codons, termination)
- Protein folding and other post-translational modifications (signal peptides, etc.)
- The types, causes, and effects of mutations (point, insertion, deletion, substitutions, missense, nonsense mutagens, etc.)
- Viruses their structures, and the main points of their lifecycles (see Figure 18.5)
- Main differences between lytic and lysogenic cycles
- Genetic recombination/transformation in bacteria (pay close attention to Figures 18.15 and 20.4)
- Transduction in bacteria (pay close attention to Figure 18.16)
- How conjugation, plasmids, and transposons increase diversity in bacteria
- Operons (lactose, *lac* operon, inducers, repressors, use Figure 18.22 to help)
- Explain why transcription is the key step for gene regulation
- Duplications, rearrangements, and mutations of DNA and how they contribute to evolution
- From our labs: (use chapter 20 for help)
    - Bacterial Transformation
    - Restriction Enzymes (Figure 20.3 and again 20.4)
    - PCR and DNA amplification (Figure 20.7)
    - Gel electrophoresis (Figure 20.8)
    - Using this DNA technology/genomics to provide genetic markers (20.9)

Evolution

- Darwin and his voyage, works, and main ideas
- Mayr's inferences and observations
- Selection (artificial, natural, stabilizing, disruptive, and directional)
- Specifically, be able to draw and explain the precursors and outcomes of natural selection in a population
- Homologies vs. analogies and convergent vs. divergent evolution and their relationships to one another (i.e. analogies lead to convergent evolution because…)
- Evidence for evolution (homologies, analogies, Darwin's finches, biogeography, natural selection, survival of the fittest, variation, fossil record, molecular homologies, mutations, Mendel, genetic drift, migrations, the human eye, HIV evolution, resistant bacteria, heterozygote advantage, speciation, vestigial structures, endosymbiosis, Pangea) ***This is the short list of the evidence for evolution covered in this unit. Use your knowledge of these facts to help you with the next bullet point.***
- So given all this evidence, why is evolution not "just a theory"?
- Why can't individuals evolve?
- The 5 Hardy-Weinberg Equilibrium postulates
- The 4 precursors to evolution
- The heterozygote advantage in malaria/sickle cell
- Speciation, types, and what drives it (think: reproductive isolation, allopatric, sympatric, polyploidy, sexual selection, adaptive radiation, evo-devo, Hox)
- Tree of Life basics
- Origins of life on Earth
- Clock analogy for geologic time and how young we as a species are. Bee sure to bee able to understand how to read this clock and the geologic record on pg. 519, but do not memorize it.
- Mass extinctions and their evidence
- The process of how we evolved from the primordial soup into the tree of life (i.e. prokaryotes first, oxygenated atmosphere, endosymbiont theory, snowball earth, eukaryotes, Cambrian explosion, the move to land from the ocean, continental drift, up to the 3 domains).
- From our labs:
    - Hardy-Weinberg Equilibrium calculations
    - How to disrupt equilibrium and the effects of this disruption
    - Chi-squared calculations
    - BLAST and its abilities to solve complex evolutionary questions
    - How to build and read phylogenetic trees/cladograms
    - SEM and Standard Deviations