

# SEMESTER 2 EXAM TOPICS

Honors 2014.2015

Below, you will find a series of TOPICS that will be covered on your HONORS BIOLOGY SEMESTER 2 EXAM. We have begun the review process by taking and assessing the last Open Binder Test. To follow-up with what we started, we will be examining each of the topics on this sheet to determine where you are in your understanding of this semester's material so that you can best prepare for next week's Semester Exam! This exam is 100 multiple choice questions and does NOT include an essay question.

## CELL CYCLE, MITOSIS, MEIOSIS & KARYOTYPES

- Know all parts of the cell cycle, Interphase, G1, S, G2, M and C--what happens during each and explain how cell division would be affected if any of the stages of INTERPHASE were to occur incorrectly.

### For MITOSIS & MEIOSIS KNOW:

- The order and name of each phase (Mitosis = IPMATC and Meiosis = IPMATCMATC)
- The structures involved in each phase.
- What each phase looks like & the # of c'somes.
- How the newly created cells compare to the original. Haploid, diploid, etc....
- The purpose of each
- Be able to look at cells in various stages of CELL DIVISION & determine if it's going through MITOSIS or MEIOSIS.
- Be able to recognize and define homologous chromosomes
- Know that cancer cells divide much faster than healthy cells and will therefore spend more time in meiosis than healthy cells.
- Explain a Nondisjunction & predict c'somal abnormalities of children created from NDJs occurring during MEIOSIS of their parents.
- For karyotypes know the difference between the autosomes and the sex c'somes.
- Be able to analyze different karyotypes to locate c'somal abnormalities and determine the severity of the abnormality.
- Be able to explain what a cross over is, when it occurs & what it results in.

## DNA/RNA Structure, DNA REPLICATION, PROTEIN SYNTHESIS & MUTATIONS

- Know all the parts of DNA and its complementary base pairs (A-T, G-C) so well you could label a diagram of DNA with ALL its parts.
- Know all the parts of a nucleotide—the sugars (deoxyribose or ribose), phosphate and nitrogenous bases (A, T, G, C) and be able to label them in a diagram!
- Know when and how DNA Replication occurs and why it's important.
- Be able to determine the order of nucleotides in any molecule (DNA template, DNA complement, mRNA, tRNA) given any of the others AND use an amino acid chart to determine the order of amino acids in the protein. In other words, fill out one of the charts! 😊
- Know similarities & differences between DNA & RNA and explain how they work together to help RIBOSOMES correctly make PROTEIN.
- Know the relationship between, DNA, genes and proteins.
- Know how the following terms/structures are involved in the process of PROTEIN SYNTHESIS: TRANSCRIPTION, mRNA, mRNA polymerase, codons, TRANSLATION, tRNA, anticodons, Ribosomes, Amino Acids, Protein.
- Know what mutations are and how they can change the resulting mRNA/protein.

## MENDEL, PUNNETTS, MODES OF INHERITANCE

- Know what Mendel did in his experiments (P1, F1 and F2) and the results he obtained.
- Describe how his results helped him establish the idea that some characteristics are dominant and some recessive.
- Be able to apply Mendel's work to human traits & explain how it is that children can show a genetic trait that neither parent does like sickle cell anemia or being left handed.
- Know the relationship between, DNA, chromosomes, genes and alleles.

## MENDEL, PUNNETTS, MODES OF INHERITANCE (cont)

- Use a family tree to determine if a trait is DOMINANT or RECESSIVE and explain using proof from the family tree.
- Use Punnetts w/family trees to determine possibilities for the children and report as a fraction, % and/or ratio.
- Know HOW and WHEN to use dihybrid crosses for any trait using 2 punnetts and multiplying.
- Know the genotypes for blood kind (  $I^A$ ,  $I^B$ ,  $i$  ) and Rh factor (FF, Ff, ff).
- Explain what type of blood could be donated or received in a transfusion & why!
- Interpret story problems based on blood typing and do punnetts &/or dihybrid crosses.
- Be able to define linked genes as genes found on the same chromosome.
- Be able to recognize, explain, and/or describe examples of the following modes of inheritance: Recessive, Dominant, Codominance, Incomplete Dominance, Polygenic, X-Linked.
- For X-Linked Inheritance know how to write the genotypes.

## EVOLUTION & TAXONOMY

- Know what natural selection is and be able to recognize it if given examples.
- Be able to recognize and describe the 5 agents of change in a gene pool: natural selection, genetic drift, mutation and nonrandom mating.
- Be able to define fitness in terms of natural selection
- Know that when humans selectively breed organisms for a specific trait, it is called artificial selection.
- Be able to explain the Hardy-Weinberg principal and determine if a population is at equilibrium by looking at a graph of allele frequencies.
- Memorize and know how to use the two Hardy-Weinberg equations. Using these equations, be able to solve for allele frequencies and genotype frequencies.
- Know that adaptations are characteristics that make an organism more fit to survive in its environment and how they relate to its ability to reproduce.

## HUMAN BODY SYSTEMS, DISSECTION

- Know the general functions of the following human body systems: Respiratory, Circulatory, Digestive, Nervous, Excretory (Urinary).
- Know the overall purpose of the Respiratory System and its importance for cellular respiration.
- Be able to identify all the part of the Respiratory System: Trachea, Bronchi, Bronchioles, Alveoli and Capillaries and explain the function of each as it pertains to the movement of  $O_2$  into the body and  $CO_2$  out of the body.
- For the following structures of the heart: Left Atrium, Left Ventricle, Right Atrium, Right Ventricle, Aorta, Vena Cava, be able to do the following: 1) locate them in a diagram 2) know if they carry  $O_2$  rich or  $O_2$  poor blood and 3) how the blood flows through them (think: where is the blood coming from and where is it going?).
- Know that hemoglobin is the molecule in Red Blood cells that is responsible for carrying  $O_2$
- Know differences between the arteries and veins— come up with as many as possible.
- Be able to look at pictures from the pig dissection and label structures.