Honors Biology
Semester 2 Review

Chapter 8 – Unit 5 (5.3 ONLY) Meiosis, reproductive methods (sexual vs. asexual), cancer

1) What are the main differences between asexual and sexual reproduction?
2) Be able to distinguish between the various forms of DNA seen during the cell cycle, from chromatin to chromosomes, as well the different parts of the chromosome, from the centromere to sister chromatids.
3) Draw a labelled diagram that represents all of the stages of the cell cycle, the relative length of time it takes for each stage to occur, and the major events that happen in each stage.

4) Understand how the cell cycle is controlled and regulated.
5) Be able to distinguish between the purpose of mitotic cell division and meiotic cell division.
6) Understand the major differences between what happens to chromosomes during mitosis and what happens to them during meiosis.
7) Understand why gametes contain half (haploid) the normal number (diploid) of chromosomes in a sexually-reproducing organism.
8) Understand how meiosis generates entirely unique sex cells throughout the lifetime of an

Unit 6 (Genetics and Molecular Inheritance/Expression)

Chapter 9 (see pages 178-180)

1) Explain the basics of the experiments Mendel conducted to establish the basic laws of inheritance.
2) Define the following terms: trait, allele dominant, recessive, homozygous, heterozygous, true-breeding, hybrid
3) Complete the concept map (#1) on page 179.
4) What is Mendel's Law of Segregation? What does it imply about meiosis?
5) What does Mendel's law of independent imply about genes? Discuss why the 9:3:3:1 ratio supports this law.
6) Describe the following variations on Mendel's laws:
    - incomplete dominance
    - codominance
    - pleiotropy
    - polygenic inheritance
7) Define the term "linked genes" and describe how it can be used in chromosome mapping.
8) What are the differences in inheritance between males and females in sex-linked (Specifically X-linked) traits (ie: patterns of inheritance, carriers vs. affected individuals, etc).

Chapter 10-11

1) Describe the structure of DNA including a description of bonding between all necessary monomers:
2) What are the differences between purines and pyrimidines?
3) Discuss and diagram the two major steps of protein synthesis (transcription and translation).
4) What would be the polypeptide for the gene AAT CCA GGC CGA TTT AUU?
5) What are the three major categories of genetic mutations?
6) Using E. Coli and the sugar lactose as an example, discuss how gene regulation occurs in bacteria (use promotor, operator, repressor gene, regulatory gene, etc in answer)

7) What are the functions of repressors and activators in gene regulation?
8) Name three ways gene expression can be blocked
9) What is X-Inactivation?
10) How is Eukaryotic gene regulation different than prokaryotic gene regulation?
11) How does alternative RNA splicing lead to different polypeptide chains?
12) What are four ways that RNA can be regulated once it reaches the cytoplasm?
13) What is an oncogene? What are three ways in which a proto-oncogene can change its expression to stimulate cells to divide excessively?
14) Why is DNA replication considered "semi-conservative?"
15) Diagram the process of DNA replication: (showing differences in base additions for leading and lagging strands).

Unit 7 (Evolution)

Chapters 13-15

1) How did Charles Lyell and Thomas Malthus shape Darwin's thinking?
2) What is artificial selection? How is it different from Natural Selection? What is an example of Artificial Selection?
3) What were some of the observations and connected inferences Darwin made that influenced his understanding of the natural world that lead to Natural Selection?
4) Provide examples of how Biogeography, comparative anatomy, and molecular biology support the idea that organisms change over time.
5) What are homologous characteristics (both anatomical and molecular)? How are they used to determine evolutionary relationships?
6) Define: organism, species, population, and gene pool:
7) Discuss two ways that genetic variation can arise in a population:
8) State the Hardy-Weinberg principle. How does this equation determine if a population is evolving?
9) What are the "five fingers of evolution"? How do they lead to microevolution?
10) What is "fitness" in regards to evolution?
11) Compare and contrast stabilizing selection, directional selection, and disruptive selection.
12) Define speciation:
13) What are the four species concepts? Explain each:
14) What are the prezygotic barriers (5)? What are the postzygotic barriers (3)?
15) Compare and contrast allopatric speciation to sympatric speciation (include the evidence used for both).
16) What is adaptive radiation? What are some mechanisms that can lead to this?
17) Create a flow chart or timeline that list the major events in in Earth history (in regards to evolution of life).
18) How do mass extinctions lead to major evolutionary changes?
19) What does a cladogram show? Draw an example of one:
20) How does natural selection occur? Draw the "natural selection flow chart" and apply a specific example from class to it:
21) What is convergent evolution? Coevolution?
22) What is the bottleneck effect? A founder event? How are they similar and how are they different

For Human Body Systems – See Reminders on Website. For Ecology – see lessons posted and textbook