K. Sorensen Biol. 1310 Name: _____

Study Guide for Unit 4

1. Understand Griffith's experiment.
2. Understand Avery Macleod and McCarty's experiments and what they showed.
3. Understand Hershey-Chases' experiments and what they showed.
4. Know Chargaff's rules.
5. What was Rosalind Franklin's contribution to the structure of DNA?
6. Know Watson and Crick's DNA structure. Bases per turn, width, major and minor grooves, etc.
7. Know the base pairing rules.
8. What does 5' and 3' refer to?
9. What is hyperchromatic shift?
10. What is melting of DNA and how do GC content affect this?
11. How does RNA differ from DNA?
12. Know the structure of B-DNA and A, Z , H DNA compare.
13. Know the three models of DNA replication and Meselson and Stahl's experiments.
14. Be able to diagram a replicon. Include helicase, topoisomerase, polymerase III, polymerase I, primase, RNA primers, single stranded binding proteins, Okazaki fragments, DNA ligase, ori site, leading strand, lagging strand, direction of synthesis, and direction of reading.
15. What components of DNA make up an ori site? What are the differences between prokaryotes and eukaryotes?
16. Briefly compare prokaryotic polymerases and eukaryotic polymerases.
17. How do these enzymes proofread? What do they do when they find a mistake? Describe a repair mechanism.
18. How are telomeres replicated?
19. Know the structure of the ribosome and tRNA.
20. Know the Central Dogma of Gene expression as proposed by Watson and Crick.
21. How do we know that the genetic code is triplet?
22. Diagram a prokaryotic operon. Include pribnow box, TTGAGA, Shine-Delgarno sequence, start of transcription, start of translation, stop of translation, upstream, downstream, and polycistronic genes.
23. Diagram an eukaryotic gene. Include monocistronic gene, TATA box, GC Boxes, CCAAT box, enhancers, 7mG cap, exons, introns, start of transcription, start of translation, termination of translation, polyA cleavage and polyadenlylation site.
24. What are sigma factors and their function?
25. What are TFIIA, TFIID, TFIIB and what are their functions?
26. What are the start and stop codons?
27. Be able to translate a mRNA into a protein, tRNA, template DNA, and coding DNA.
28. Describe the differences between prokaryotic translation and eukaryotic translation.
29. Know the function of aminoacyl-tRNA synthetase.
30. Describe the steps in translation.
31. Describe how introns are spliced out of the hnRNA.
32. What is the function of the poly A tail and 5'Cap.
33. Where do the steps of RNA splicing take place in the cell?
34. How are proteins targeted to different organelles?
35. How are proteins targeted to the ER?
36. What types of mutations are there and how do they affect protein synthesis.
37. What causes mutations? What is a tautomeric pairing?
38. Know helix-turn-helix, zinc fingers, and leucine zipper motifs and how they work.
39. Know how the trp operon works. An example of a repressible gene.
40. Know how the lac operon works. An example of an inducible operon and an activator.
41. How do enhancers work?
42. How does chromosome structure affect DNA regulation? DNA methlylation, nucleosomes.
43. What some posttranslational control mechanisms?
44. What is a point mutation, base substitution, insertion, and deletion? How do these mutations affect the gene product?
45. What are transpositons and rearrangements?
46. What is a Thymine-thymine dimer how is it repaired.
47. How do base analogs cause mutations?
48. What is cancer?
49. Describe the Ames test.
50. What are restriction enzymes?
51. What is recombinant DNA?
52. What is a cloning vector? Insert? Plasmid? Ti plasmid?
53. Describe pUC18.
54. What is cDNA? How is it made?
55. What is PCR and how does it work?

56. What is a library? Genomic library and cDNA library? How do they differ?
57. Be able to explain the blue-white selection from lab.
58. What is a probe?
59. What is DNA gel electrophoresis and how does it work?
60. What is a Southern blot? Northern blot? Western blot?
61. Why are dideoxy nucleotides important for sequencing DNA?
62. What is a knockout mouse? Chimera?
63. What is gene therapy?
64. What is Lamarkism?
65. What is natural selection?
66. What is ultimate source of genetic variation? How is it spread through a population?
67. Describe Hardy-Weinberg equilibrium in the terms of p and q.
68. Be able to calculate allele frequencies and genotype frequencies.
69. What factors affect Hardy-Weinberg equilibrium? Describe each one?
70. Be able to describe disruptive selection, Directional selection, and stabilizing selection.

On this page diagram prokaryote transcription labeling key components and numbering them in the order in which they occur. Point out key eukaryote differences.

26. On this page outline the steps of prokaryote translation (protein synthesis). Point out key differences in eukaryote translation of mRNA into proteins.