The Cell Cycle, Genetics, and Protein Synthesis
Chapter Four Study Guide
Hot List Questions >

1. >What is the structure and function of deoxyribonucleic acid (DNA)?
2. Where is DNA located inside the cell?
3. Where are covalent bonds and hydrogen bonds formed in the DNA structure?
4. >What four nucleotides are used to make DNA?
5. What four nucleotides are used to make mRNA?
6. Is RNA a single stranded of double stranded molecule?
7. >What three RNA molecules are required to make proteins?
8. What is the function of microRNA?
9. >What is complementary base paring? Significance?
10. >What is semi-conservative replication? Significance?
11. >What are chromosomes? Monomers? What is the difference between a chromosome and chromatin?
12. >How many chromosomes are in a human somatic cell? How many pairs?
13. >What is a gene? What kitchen term could be used to describe the function of a gene? To make what?
14. How many genes are there in a human cell? What has more genes, corn or humans?
15. >What molecule is made inside the nucleus from the coded information of DNA? What is this process called?
16. >DNA encoded information is used to only make proteins. How do cells make the other three macromolecules? Where does this occur?
17. >When during the cell cycle do we use chromatin and chromosome to describe DNA?
18. >Before a cell enters mitosis, what must happen to the DNA? When does this occur during the cell cycle?
19. >Protein is constructed from 20 amino acids (these are the monomers). How many nucleotides in a DNA molecule are required to code for one amino acid?
20. >What is a base triplet? Where is it located?
21. >What is a codon? Where is it located? How many nucleotides are in a condon?
22. >What is an anticodon? Where is it located? How many nucleotides are in an anticodon?
23. >What is a transcription? Where within the cell does this occur?
24. >What is translation? Where within the cell does this occur?
25. >What is a transcription factor?
26. Genes can be turned on or turned off like a light switch. What does this mean? Significance? Think about the female mammary gland. What must happen during the pregnancy and after parturition before the gland can produce milk?
27. Are some genes always turned on? Give an example (hint: ATP production).
28. What is classical genetics? Modern genetics? What is epigenetics? How does epigenetics influence gene function?
29. >Where are proteins made?
30. >What do we mean by structural vs functional proteins?

31. Outline the steps of protein synthesis from DNA to the protein.
32. >What is a polyribosome? Significance?
33. What are “chaperone” proteins?
34. >What two “classes” of ribosomes are found inside of our cells? What is the function of each class of ribosome?
35. Where does post-translational protein modification occur for proteins to be exported out of our cells? (note two locations)
36. What happens to proteins in the smooth endoplasmic reticulum?
37. What happens to protein in the Golgi apparatus? (Hint: two things occur)
38. >What is the function of a transport vesicles? How is this structure moved in the cytosol?
39. >What is the function of secretory vesicles? How is this structure moved in the cytosol?
40. >Human cells have 46 chromosomes. If you want to reproduce a cell (i.e. make an identical copy of the cell) then each new cell must also have 46 chromosomes. Somewhere during this process, the dividing cell must therefore “double” the chromosome number (i.e. 46 to 92 chromosomes). After a cell divides each new cells will have a strand of the original DNA molecule and a strand made from newly formed nucleotides. What term describes this process?
41. What is the significance of these terms in cell division: a) DNA helicase, b) the replication fork, c) DNA polymerase.
42. What is a mutation?
43. >What is the Cell Cycle?
44. >What terms are used to define the two phases of the cell cycle? What occurs during each phase?
45. >What occurs during the G1 phase, S phase, and G2 phase? Where do these events occur in the cell cycle?
46. >What does it mean if a cell is in G zero? Why might this occur? Are some cells always in G zero? Explain.
47. >What is mitosis?
48. >What type of tissue divide by mitosis?
49. >What tissues are unable to reproduce by mitosis?
50. >What is meiosis?
51. What type of tissue divide by meiosis?
52. What are these cells called in males vs females?
53. >How many chromosomes are in a diploid cell?
54. >How many chromosomes are in a haploid cell?