

The Cell Cycle, Genetics, and Protein Synthesis
Chapter Four Study Guide

1. What is the structure of deoxyribonucleic acid (DNA)?
2. What is the function of deoxyribonucleic acid (DNA)?
3. Where is DNA located?
4. What four nucleotides are used to make DNA?
5. Where are covalent bonds and hydrogen bonds used in DNA's structure? What is the role of each bond type in the DNA structure?
6. What is RNA?
7. What are the four nucleotides used to make RNA?
8. Is RNA a single stranded or double stranded molecule?
9. What three RNA molecules are required to make proteins?
10. What is the function of microRNA?
11. What is complementary base pairing? Significance?
12. What is semi-conservative replication? Significance?
13. Where are chromosomes? Location?
14. How many chromosomes are in a human somatic cell?
15. What is a gene? What "nick-name" describes a gene?
16. How many genes are there in a human cell?
17. What molecule is made inside the nucleus from the coded information of DNA?
From this molecule's coded information, what is the next molecule made?
18. DNA contains the code to make protein. How do cells make the other three macromolecules?
19. DNA is a polymer of nucleic acids. When during the cell cycle do we use the terms chromatin and chromosome to describe DNA?
20. Before a cell enters mitosis, what must happen to the DNA? When does this occur during the cell cycle?
21. How is RNA similar to DNA?
22. How is RNA different than DNA?
23. 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?
24. What is a base triplet? Where is it located?
25. What is a codon? Where is it located? How many nucleotides are in a codon?
26. What is an anticodon? Where is it located? How many nucleotides are in an anticodon?
27. What is a transcription? Where within the cell does this occur?
28. What is translation? Where within the cell does this occur?
29. What is a transcription factor?
30. Genes can be turned on or turned off like a light switch. What does this mean? Significance?
31. Are some genes always turned on? Give an example (hint: ATP production).
32. What is epigenetics? How does epigenetics influence gene function?
33. What two terms describe in general how our cells use proteins?
34. Where are proteins made?
35. What are the steps in Protein Synthesis from DNA to protein?

36. What is a polyribosome? Significance?
37. What are “chaperone” proteins?
38. What are the two different ribosomes found inside of our cells? What are their function?
39. How is protein synthesis different for proteins used in the cytosol VS proteins to be exported into the interstitial space?
40. Where does protein post-translational modification first occur for proteins to be exported out of our cells?
41. What happens to proteins in the smooth endoplasmic reticulum?
42. What happens to protein in the Golgi apparatus? (Hint: two things occur)
43. What is the function of a transport vesicles?
44. What is the function of secretory vesicles?
45. 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 and we look at the DNA in each of the new cells we see each chromosome will have a strand of the original DNA molecule and a strand made from newly formed nucleotides. What term describes this process?
46. What is the significance of these molecules in cell division: a) DNA helicase, b) the replication fork, c) DNA polymerase.
47. What is a mutation?
48. What is the Cell Cycle?
49. What terms are used to define the two phases of the cell cycle? What occurs during each phase?
50. What occurs during the G1 phase, S phase, and G2 phase? Where do these events occur in the cell cycle?
51. What does it mean if a cell is in G zero? Why might this occur? Are some cells always in G zero? Explain.
52. What is mitosis?
53. What type of tissue divide by mitosis?
54. What type of tissue is unable to reproduce by mitosis?
55. What is meiosis?
56. What type of tissue divide by meiosis?
57. What are these cells called in males vs females?
58. How many chromosomes are in a diploid cell?
59. How many chromosomes are in a haploid cell?