

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

1. >What is the structure and function of deoxyribonucleic acid (DNA)?
2. Where is DNA located?
3. >What are the four monomers that are used to construct DNA?
4. DNA is described as a double helical molecule. How may you use a garage item to describe DNA's structure? Explain.
5. >How are both covalent bonds and hydrogen bonds used in DNA's structure? Explain the role of each bond type.
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 needed to construct proteins?
10. What is the function of microRNA?
11. >What is complementary base pairing? Significance?
12. >What is semi-conservative replication? Significance?
13. What is a chromosome? Location?
14. >How many chromosomes are in a human somatic cell?
15. >What is a gene? What is the "nick-name" used to describe 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 coded information, what is the next molecule made?
18. >If DNA is an information molecule that makes only protein then how are sugar and lipid molecules made? Explain this process?
19. >DNA is a polymer of nucleic acids. We describe the macromolecule using the terms chromatin or chromosome during the cell cycle. Explain.
20. >Before a cell enters mitosis, what must happen to the DNA? When does this happen during the cell cycle?
21. How is RNA similar to DNA?
22. How is RNA different than DNA?
23. >Protein is a polymer that is constructed from 20 amino acids (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 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.
32. >What happens if a gene is activated (i.e. turned on)? Give an example.
33. What is epigenetics? How does epigenetics influence gene function?

34. >What are the steps in Protein Synthesis from DNA to protein?
35. What is a polyribosome? Significance?
36. What are “chaperone” proteins?
37. >What are the two different types of ribosomes found inside of our cells? What is the purpose of each ribosome type?
38. Where does the first protein post-translational modification occur if it is a protein that will be exported outside of our cells?
39. >What happens to proteins in the smooth endoplasmic reticulum?
40. What happens to protein in the Golgi apparatus? (Hint: two things occur)
41. >What is the function of a transport vesicles?
42. >What is the function of secretory vesicles?
43. 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?
44. What is the significance of complementary base pairing?
45. >What is the significance of these molecules in cell division: a) DNA helicase, b) the replication fork, c) DNA polymerase.
46. What is a mutation?
47. >What is the Cell Cycle?
48. What terms are used to define the two phases of the cell cycle? What occurs during each phase?
49. >What occurs during the G1 phase, S phase, and G2 phase? When during the cell cycle do these events occur?
50. >What does it mean if a cell is in G zero? Why might this occur? Are some cells always in G zero? Explain.
51. >What is mitosis?
52. What type of cells are able to undergo mitosis?
53. >What type of cells are unable to undergo mitosis?
54. >What is meiosis?
55. >What type of cells undergo meiosis? What are these cells called in males vs females?
56. >How many chromosomes are in a diploid cell? What do we call these cells?
57. >How many chromosomes are in a haploid cell? What do we call these cells?

Add these to your HL questions:

58. >What type of molecule is made with the information encoded in DNA?
59. >How do we describe the two different types of proteins that are encoded by DNA?
60. >Outline the steps in protein synthesis: (gene to protein)
61. >Where are proteins made?

62. >What organelle makes a protein? What other components are required to make proteins?
63. >How is protein synthesis different when proteins are used in the cytosol VS exported into the interstitial space?