Things to Know - Chem 30B

Chapter 26 – Nucleic Acids

1. What does DNA stand for? What does RNA stand for?
2. What is the difference between a gene and a chromosome?
3. What are the components of a nucleotide?
4. What are the possible sugars? What are the possible nitrogen bases? Which are in DNA, and which are in RNA?
5. What is the difference between a purine and a pyrimidine? Which bases are purines and which are pyrimidines?
6. What is a nucleoside?
7. Be able to draw and name nucleotides and nucleosides.
8. Be able to draw and name nucleotide diphosphates and triphosphates.
9. Understand and be able to draw the general structure of a nucleic acid chain. (Alternating phosphate-sugar backbone, with nitrogen bases attached to the sugars.)
10. Be able to draw a dinucleotide (two nucleotides covalently connected) or a trinucleotide.
11. Be able to recognize the 5′ and the 3′ end of a nucleic acid chain.
12. By convention, nucleic acid sequences are listed starting with the 5′ end.
13. Understand the three-dimensional structure of a DNA chain – "double helix". Which groups are on the outside of the helix and which groups are on the interior?
14. If nucleic acid chains are double-stranded, the two strands are oriented in opposite directions. (One strand is 5′ to 3′, the other is 3′ to 5′.)
15. Be able to draw an A - T and a G – C base pair. (This means that they are hydrogen bonded together.)
16. Given the sequence of one strand of DNA or RNA, be able to give the sequence and orientation of the complementary strand.
17. What is the biological function of DNA?
18. Understand and be able to define the processes of replication, transcription, and translation.
19. Why must DNA be replicated?
20. Understand and be able to describe the steps in DNA replication.
21. What enzyme is involved in replication? What reaction does it catalyze?
22. In DNA replication, how does the cell "know" what the sequence of the new strand should be?
23. What is meant by the term "semiconservative replication"?
24. What is the function of DNA ligase?
25. What direction does the DNA polymerase go on the template strand?
26. How is RNA different than DNA?
27. What are the functions of the three types of RNA?
28. Understand and be able to describe the steps in transcription.
29. What enzyme is involved in transcription?

30. What is the difference between the template strand and the informational strand?
31. How does the cell "know" how long the RNA should be?
32. What are introns?
33. What other processing must happen before the mRNA is ready to be used?
34. Given the sequence of the DNA template strand OR informational strand, give the sequence of the RNA produced.
35. Understand how to use the genetic code chart.
36. Codons are mRNA sequences, and they are written 5′ → 3′.
37. Given an mRNA sequence, determine the corresponding amino acid sequence.
38. Given a DNA template strand sequence OR informational strand sequence, determine the corresponding amino acid sequence. (You will need to determine the mRNA sequence first.)
39. Given an amino acid, determine the possible codons for it.
40. What is the general structure of a tRNA molecule?
41. What is an anticodon?
42. Understand and be able to describe the steps in translation.
43. What is "translocation"?
44. How does the cell "know" what the sequence of amino acids in a protein should be?
45. How does the cell "know" how long a given protein should be?
46. What is a mutation?
47. What are some possible causes of mutations?
48. Why is a mistake in mRNA transcription <u>not</u> a serious problem?
49. Understand each category and type of mutation.
50. Given an initial and mutated DNA sequence, be able to determine the type of mutation. Be able to determine the original and mutated amino acid sequence in the resulting protein. Speculate on how the change could affect the protein.
51. Which types of mutations are the most serious?

Related Topic

1. How does a cell "know" which proteins it should produce? (Genetic control – Chapter 19)

Chapter 25

1. Briefly explain the process of protein digestion: where it occurs, what enzymes are involved, and the order of steps.

2. What are amino acids (obtained in the diet) used for in the body?