**1. The bonding of two amino acid molecules to form a larger molecule requires**A) the release of a water molecule. B) the release of a carbon dioxide molecule.   
C) the addition of a nitrogen atom. D) the addition of a water molecule.

**Chapter 5: Biological Molecules (Proteins and Nucleic Acids)**

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**2. There are 20 different amino acids. What makes one amino acid different from another?**A) different side chains (R groups) attached to a carboxyl carbon   
B) different side chains (R groups) attached to the amino groups   
C) different side chains (R groups) attached to an α carbon   
D) different structural and optical isomers   
E) different asymmetric carbons

**3. Upon chemical analysis, a particular polypeptide was found to contain 100 amino acids. How many peptide bonds are present in this protein?**A) 101 B) 100 C) 99 D) 98 E) 97

**4. How many different kinds of polypeptides, each composed of 12 amino acids, could be synthesized using the 20 common amino acids?**A) 4¹² B) 12²⁰ C) 240 D) 20 E) 20¹²

**5. Which bonds are created during the formation of the primary structure of a protein?**A) peptide bonds B) hydrogen bonds C) disulfide bonds D) phosphodiester bonds

**6. Which type of interaction stabilizes the α helix and the β pleated sheet structures of proteins?**A) hydrophobic interactions B) disulfide bonds C) ionic bonds D) hydrogen bonds E) peptide bonds

**7. Which level of protein structure do the α helix and the β pleated sheet represent?**A) primary B) secondary C) tertiary D) quaternary

**8. What type of covalent bond between amino acid side chains (R groups) functions in maintaining a polypeptide's specific three-dimensional shape?**A) ionic bond B) hydrophobic interaction C) van der Waals interaction D) disulfide bond

**9. At which level of protein structure are interactions between the side chains (R groups) most important?**A) primary B) secondary C) tertiary D) quaternary E) all of the above

**10. Which of the following techniques uses the amino acid sequences of polypeptides to predict a protein's three-dimensional structure?**A) X-ray crystallography B) bioinformatics D) NMR spectroscopy E) high-speed centrifugation

**11. If cells are grown in a medium containing radioactive ³⁵S, which of these molecules will be labeled?**A) phospholipids B) nucleic acids C) proteins D) amylose

**12. What is the term used for a protein molecule that assists in the proper folding of other proteins?   
A) tertiary protein**B) chaperonin C) enzyme protein D) renaturing protein E) denaturing protein

**13. Which of the following statements about the 5' end of a polynucleotide strand of DNA is correct?**A) The 5' end has a hydroxyl group attached to the number 5 carbon of ribose.   
B) The 5' end has a phosphate group attached to the number 5 carbon of ribose.   
C) The 5' end has phosphate attached to the number 5 carbon of the nitrogenous base.   
D) The 5' end has a carboxyl group attached to the number 5 carbon of ribose.   
E) The 5' end is the fifth position on one of the nitrogenous bases.

**14. If ¹⁴C-labeled uridine triphosphate is added to the growth medium of cells, what macromolecules will be labeled?**A) phospholipids B) DNA C) RNA D) both DNA and RNA E) proteins

**15. Which of the following are nitrogenous bases of the pyrimidine type?**A) guanine and adenine B) cytosine and uracil C) thymine and guanine D) ribose and deoxyribose

**16. Which of the following are nitrogenous bases of the purine type?**A) cytosine and guanine B) guanine and adenine C) adenine and thymine D) thymine and uracil

**17. If a DNA sample were composed of 10% thymine (T), what would be the percentage of guanine (G)?**A) 10 B) 20 C) 40 D) 80 E) impossible to tell from the information given

**18. The difference between the sugar in DNA and the sugar in RNA is that the sugar in DNA**A) is a six-carbon sugar and the sugar in RNA is a five-carbon sugar.   
B) can form a double-stranded molecule.   
C) is an aldehyde sugar and the sugar in RNA is a keto sugar.   
D) is in the α configuration and the sugar in RNA is in the β configuration.   
E) contains one less oxygen atom.

**19. If one strand of a DNA molecule has the sequence of bases 5'ATTGCA3', the other complementary strand would have the sequence**A) 5'TAACGT3'. B) 5'TGCAAT3'. C) 5'UAACGU3'. D) 3'UAACGU5'.

**20. A new organism is discovered in the forests of Costa Rica. Scientists there determine that the polypeptide sequence of hemoglobin from the new organism has 72 amino acid differences from humans, 65 differences from a gibbon, 49 differences from a rat, and 5 differences from a frog. These data suggest that the new organism**A) is more closely related to humans than to frogs.   
B) is more closely related to frogs than to humans.   
C) evolved at about the same time as frogs, which is much earlier than primates and mammals.   
D) is more closely related to humans than to rats.  
E) is more closely related to frogs than to humans and also evolved at about the same time as frogs, which is much earlier than primates and mammals.

**21. If cells are grown in a medium containing radioactive ¹⁵N, which of these molecules will be labeled?**A) fatty acids only B) nucleic acids only C) proteins only D) E) both proteins and nucleic acids