

1. Which one is the largest component of DNA among the following:
 - a. Nucleoside
 - b. Purine base
 - c. Nucleotide
 - d. Pentose sugar
2. Draw the structure of the dinucleotide 5'-TG-3'. Label the 5' and 3' ends. Also label the nitrogenous bases, sugar ring and phosphate moiety.
3. One complete turn of a DNA double-helix measures
 - a. 2.0 nm
 - b. 3.6 nm
 - c. 0.34 nm
 - d. 10 nm
4. In DNA double helix, the two DNA chains are held together by
 - a. covalent bonds between the pair of bases
 - b. hydrogen bonds between the pair of bases
 - c. ionic bonds between the pair of bases
 - d. none of the above
5. Write down the complimentary sequence for 5'-ATCGTTAGGCTA-3'
5'- _____ -3'
6. The accepted hypothesis for DNA replication is
 - a. Conservative mechanism
 - b. dispersive mechanism
 - c. conservative and dispersive both
 - d. semi-conservative
7. In the study of one experiment it was found that the value of T_m for DNA is = 60° C. If that DNA sample has 30% GC at the above T_m , then what will be the value of ' T_m ' if the GC% increases to 50%?
 - a. Increases
 - b. Decreases
 - c. Remains same
 - d. Can't be predicted
8. If one DNA sample has 40% AT content, what will be the percentage of Guanine residue in that DNA sample?
9. What are the relationships among nucleotide, codon, gene, chromosome and DNA?
10. If you run 35 cycles of PCR, by what factor does the target sequence theoretically increase?
11. Which DNA polymerase removes RNA primers during DNA synthesis?
12. The pH of a solution is determined by

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|--------------------------------------|--|
| a. concentration of salt | b. relative concentration of acids and bases |
| c. dielectric constant of the medium | d. environmental effect |

13. Which of equation indicates that the pK_a of an acid is numerically equal to the pH of the solution when the molar concentration of the acid and its conjugate base are equal?

14. Most of the important functional groups in biological molecules contain

- a. oxygen and/or nitrogen and are acidic
- b. oxygen and a phosphate
- c. nitrogen and a phosphate
- d. oxygen and/or nitrogen and are polar

15. The lone pair electrons on oxygen in a H_2O molecule

- a. carry a partial positive charge
- b. are not important for the properties of water
- c. carry a partial negative charge
- d. form covalent bonds in ice

15 The following single stranded (ss) DNA and the two primers were used for PCR reaction:

ssDNA 5' ATGGCCTAGAGATGCAATCGTTACG 3'

Primers: 5' ATGGCCTAG 3' and 5'CGTAACGAT 3'

a) What other reagents are required to successfully run the PCR?

b) Write down the sequence of the PCR product in the double stranded DNA form with direction of strands.

16. Suppose we assign numerical values to each nucleotide base as follows:

A: 0; T: 1; G: 2; C: 3

In that case, the DNA sequence 5'-TATA-3' will have a numerical value of 68 (in base 10).

a) Convert the following DNA sequences to their numerical values:

5'-TCCGAT-3'

5'-TGCAAT-3'

b) Convert the following binary code to a DNA sequence:

10110000000110010110