



BIOLOGY

BOOKS - CHETANA PUBLICATION

MOLECULAR BASIS OF INHERITANCE

Example

1. What is Nucleic acid ?



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2. What are the types of Nucleic acid ?



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3. Explain briefly the discovery of Nucleic acids.



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4. Enlist the properties/characteristics of Genetic material.



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5. Describe the experiment in brief which proves that DNA is the genetic material.



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6. Describe the Griffith's experiment for the identification of genetic material.



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7. Explain Griffith's Experiment.



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8. A non- pathogenic strain of bacteria suddenly changes into pathogenic strain. Is this possible? Why?



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9. What is transformation? Who discovered it?



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10. Explain the experiment to prove that "Transforming Principle" is DNA.



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11. Explain Avery, Macleod and McCarty experiment.



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12. Define transduction.



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13. Write a short note on transduction.



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14. Explain how did A. D. Hershey and M. J. Chase differentiate DNA and proteins in their

experiment while proving that DNA is the genetic material?



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15. DNA is a genetic material. Justify.



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16. Explain briefly the phenomenon of transduction.



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17. Distinguish between: Transformation and Transduction



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18. Describe DNA packaging of prokaryotes.



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19. State the length of DNA double helix molecule in a typical mammalian cell.



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20. Describe the prokaryotic nucleus.



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21. Write a note on replication in prokaryotes.



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22. Write a short note on DNA packaging in Eukaryotic cell.



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23. Write a note on nucleosome structure.



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24. Which are the nucleosomal 'core' histones?



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25. Significance of chromatin packaging?



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26. What are the functions of nucleic acids?



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27. Distinguish between Euchromatin and Heterochromatin



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28. What is the key difference between DNA in prokaryotic and eukaryotic cell?



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29. Distinguish between Prokaryotic Nucleus and Eukaryotic Nucleus



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30. Multiple forms of DNA and their differences



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31. Significance of different forms of DNA.



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32. What are the chemical components of DNA?



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33. What are chromosomes? OR What is chromosome?



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34. What is the backbone of DNA structure?



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35. Name the nitrogen bases of DNA.



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36. What are nucleoside and nucleotide?



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37. Is the double helix right hand or left hand?



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38. What is the key difference between DNA in prokaryotic and eukaryotic cell?



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39. Define replication. Describe DNA replication in eukaryotic cell.





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40. Describe the semi-conservative method of DNA replication



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41. Define replication. Describe DNA replication in eukaryotic cell.



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42. Explain the process of DNA replication.



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43. Why are Okazaki fragments formed on lagging strand only?



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44. When does DNA replication take place?



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45. List as many different enzyme activities required during DNA synthesis as you can.



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46. This type of replication is called semiconservative replication considering the meaning of these why DNA replication is called as semi-conservative replication?



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47. DNA replication is semiconservative. Give reason/Justify.



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48. DNA replication is semiconservative. Give reason/Justify.



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49. Write a note on Okazaki fragments.





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50. Who proved that the process of DNA replication is semi-conservative?



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51. Which enzyme does remove supercoils from replicating DNA?



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52. List the enzymes involved in replication of DNA.



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53. Enlist the significance of DNA replication.



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54. Why is DNA molecule more stable genetic material than RNA? OR DNA is more stable than RNA. Justify/Give reason.



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55. Distinguish between Leading strand and Lagging strand



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56. Describe Meselson and Stahl's Experiment to prove that replication of DNA is semi-conservative.



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57. Distinguish between Prokaryotic DNA replication and Eukaryotic DNA replication.



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58. What is transcription?



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59. How many nucleotides are present in a codon?



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60. Name the molecule which carries anticodon?



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61. What is mutation?



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62. What do you mean by central dogma?



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63. Describe the process of transcription in protein synthesis.



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64. Describe the process of transcription in protein synthesis.



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65. What is a Gene and Transcription Unit?



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66. Distinguish between Prokaryotic DNA replication and Eukaryotic DNA replication.



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67. What is splicing? Why is splicing necessary in eukaryotic genes?



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68. What is hnRNA? Explain the changes hnRNA undergoes during the processing to form mRNA?



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69. Describe the processing of hnRNA.



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70. What is promoter in a transcription unit?

Where is it located in DNA?



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71. What is terminator? What is its significance in transcription?



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72. What is the function of an RNA prime during protein synthesis?



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73. Explain in one or two lines the function of the following : Promoter



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74. Explain in one or two lines the function of the following : tRNA



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75. Explain in one or two lines the function of the following: Exons



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76. Differentiate between Template Strand and Coding Strand.



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77. Differentiate between Prokaryotic mRNA and Eukaryotic mRNA.



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78. Differentiate between Transcription in Prokaryotes and Transcription in Eukaryotes.



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79. If the sequence of coding strand in transcription unit is written as follows: 5' ATGC ATGC ATGC ATGC ATGC ATGC 3' Write down the sequence of mRNA.



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80. Explain the process of charging of tRNA. Why is it essential in translation?



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81. Depending upon chemical nature of template (DNA/RNA), list the types of nucleic acid polymerase.



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82. Where do transcription and translation occur in bacteria and eukaryotes?



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83. Explain briefly genome.



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84. It is possible to predict sequence of codon on mRNA by studying the sequence of amino acids in a polypeptide chain.



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85. What is the amino acid sequence encoded by base sequence UCA UUU UCC GGG AGU of an mRNA segment?



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86. Enlist the characteristics of genetic code.



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87. Why the genetic code is considered as comma less?



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88. Define term-codon and codogen.



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89. What is degeneracy of genetic code ?



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90. What is degeneracy of genetic code ?



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91. If the template polynucleotide strand of DNA has the base sequence as TTACGGATA. What will be the sequence of bases on mRNA?



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92. Which codons will be possibly translated by the anticodon CGU?



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93. Why is methionine always present in the beginning of each simple protein molecule?



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94. Define nonsense condon. State its significance.



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95. Define codon. What happens when the codon on mRNA reads UAA, UAG or UGA?



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96. Why is genetic code described as degenerate?



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97. What is degeneracy of genetic code ?



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98. Explain initiation codon and termination codon with suitable examples.



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99. Explain the dual function of AUG codon.



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100. Give the example of the following:
Initiation Codon



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101. Give the example of the following:

Nonsense Codon



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102. What will happen if mRNA molecule does not have codon AUG.



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103. Formation of a specific protein is necessary for a cell. What will happen if the mRNA coding for this protein synthesis does not have codons UAA, UGA and UAG ?



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104. Explain why codons are always triplets of nitrogen bases.



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105. The addition or deletion of one nitrogen base from a sequence of codons on mRNA has more serious effects than its substitution. Explain with an example.



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106. Sometimes a change at the third nitrogen base of a codon has no effect on protein synthesis. Explain.



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107. Enlist any four salient features of genetic code.



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108. Explain briefly tRNA the adapter molecule.



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109. Name different types of RNAs.



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110. Why tRNA is called as adapter molecule?



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111. Name the site of protein synthesis.



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112. Which molecule carries information of protein synthesis from gene?



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113. Which molecule carries amino acid from cytoplasm to ribosome?



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114. State the components involved in protein synthesis.



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115. Explain briefly translation.



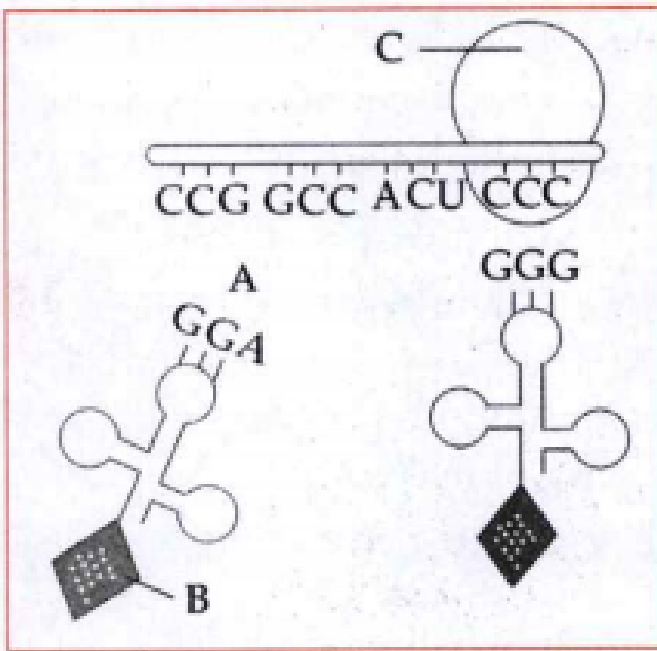
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116. Write short a note on: Translation .



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117. Identify the labeled structures on the following of translation.



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118. Explain the mechanism of translation.

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119. Describe the process of transcription in protein synthesis.



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120. What is UTR? State its significance.



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121. mRNA is short lived. Give reason.



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122. Enlist different steps of protein synthesis.



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123. Name the initiator codon of protein synthesis.



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124. Differentiate between Translational region and Un translational region.



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125. Explain in brief the process of initiation during protein synthesis.



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126. Name three binding sites of ribosome.



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127. What is translocation?



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128. Justify the statements. If the answer is false, change the underlined word(s) to make the statement true: The DNA molecule is double stranded and the RNA molecule is single stranded.





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129. Justify the statements. If the answer is false, change the underlined word(s) to make the statement true: The process of translation occurs at the ribosome.



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130. Justify the statements. If the answer is false, change the underlined word(s) to make the statement true: The job of mRNA is to pick

up amino acids and transport them to the ribosomes.



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131. Justify the statements. If the answer is false, change the underlined word(s) to make the statement true: Transcription must occur before translation may occur.



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132. Write a short note on Selenocysteine.



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133. At which level is gene expression regulated.



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134. In medium where E. coli was growing lactose was added, which induced the lac

operon. But why does lac operon shut down after some time after addition of lactose in the medium?



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135. Explain the phenomenon of induction.



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136. Describe the structure of 'Operon'.



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137. Explain the role of Lactose in Lac operon



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138. In lac operon, structural genes 'z', 'y' and 'a' code for which enzymes?



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139. Enlist the components of Lac Operon.



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140. Describe the lac-operon.



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141. Explain Regulator gene.



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142. Explain Promoter gene.



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143. Explain Operator gene.



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144. Explain Structural gene.



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145. Explain Structural gene.



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146. Explain the role of Lactose in Lac operon



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147. If operator gene is deleted due to mutation, how will *E. coli* metabolise lactose?



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148. Find out information about Trp-operon, Ara-operon, His-operon, Val-operon.



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149. What is the role of a repressor gene?



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150. Name the different structural genes in sequence of lac operon.



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151. Which molecule does act as inducer molecule in lac operon?



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152. In which condition, lac operon is switched off?



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153. What is genome?



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154. Who introduced the term Genome?



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155. Explain briefly genome.



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156. Name two types of maps generated by HGP.



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157. Who coined the term genomics?



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158. Describe the phenomenon of genomics.



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159. State the classification of genomics study.



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160. Enlist the applications of genomics.



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161. Who initiated Human Genome Project?



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162. Name the additional contributors for HGP.



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163. Enlist the aims of HGP.



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164. Write a note on Human Genome Project (HGP).





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165. What is bioinformatics.



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166. Explain briefly the role of Human Genome Project.



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167. State the comparative genome sizes of human and other models' organisms.



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168. State the significance for comparative studies.



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169. What have we learnt from the Human Genome Project?



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170. Why is HGP important?



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171. Do different organisms have the same DNA?



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172. Explain briefly the steps involved in DNA fingerprinting.



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173. What is responsible for determining characters of the organisms as well as its inheritance.



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174. Why do we differ from our parents?



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175. What do the above differences give rise to?



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176. What is DNA finger printing?





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177. Name the technique developed to identify a person with the help of DNA restriction analysis.



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178. The technique of DNA fingerprinting was given by whom?



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179. DNA finger printing is based on what?



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180. How much percent of nucleotide sequence is similar?



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181. State the technique by which DNA amplification is done.



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182. State the key factor in DNA profiling .



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183. Write a note on applications of DNA finger printing.



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184. Differentiate between Carbohydrate and Protein.



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185. Differentiate between Transcription and DNA Replication



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186. Distinguish between Transcription and Translation:



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187. Guess the possible locations of DNA on the collected evidence from a crime scene.



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188. Guess the possible sources of DNA.



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Exercise

1. Griffith worked on

A. Bacteriophage

B. Drosophila

C. Frog eggs

D. Streptococci

Answer:



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2. The molecular scissors/knives of DNA are

- A. Ligases
- B. Polymerases
- C. Endonucleases
- D. Transcriptase

Answer:



3. Translation occurs in the.....

A. Nucleus

B. Cytoplasm

C. Nucleolus

D. Lysosomes

Answer:



4. The enzyme required for transcription is.....

- A. DNA polymerase
- B. RNA polymerase
- C. Restriction enzyme
- D. RNA ase

Answer:



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5. Transcription is the transfer of genetic information from.....

- A. DNA to RNA
- B. tRNA to mRNA
- C. DNA to mRNA
- D. mRNA to tRNA

Answer:



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6. Which of the following is NOT a part of protein synthesis?

A. Replication

B. Translation

C. Transcription

D. All of these

Answer:



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7. In the RNA molecule, which nitrogen base is found in the place of thymine?

A. Guanine

B. Cytosine

C. Thymine

D. Uracil

Answer:



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8. How many codons are needed to specify three amino acid?

A. 3

B. 6

C. 9

D. 12

Answer:



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9. Which out of the following is NOT an example of inducible operon?

A. Lactose operon

B. Histidine operon

C. Arabinose operon

D. Tryptophan operon

Answer:



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10. Place the following event of translation in the correct sequence. (i) Binding of met-tRNA to the start codon. (ii) Covalent bonding between two amino acids. (iii) Binding of second tRNA (iv) Joining of small and large ribosome subunits.

A. (iii), (iv), (i), (ii)

B. (i), (iv), (iii), (ii)

C. (ii), (iii), (iv), (i)

D. (iv), (i), (iii), (ii)

Answer:



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11. In protein synthesis a polypeptide of five aminoacids is synthesized. Which one of the following can be correct poly peptide?

A. Glycine-Valine-Methonine-Histidine-

Lysine

B. Valine-Methonine-Histidine-Lysine-

Glycine

C. Methonine-Lysine-Glycine-Valine-

Histidine

D. Histidine-Lysine-Glycine-valine-

Methonine

Answer:



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12. Which of the following codon do not code for Valine (Val)?

A. GUC

B. GUA

C. GCA

D. GUG

Answer:



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13. The genetic code is correct- (i) Universal (ii) Commaless (iii) Degenerate (iv) Ambiguous

A. (iv), (iii), (ii)

B. (ii), (iii), (iv)

C. (i), (ii), (iv)

D. (i), (ii), (iii)

Answer:



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14. The coding sequences in split genes are called

A. Cistrons

B. Exons

C. Introns

D. Operons

Answer:



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15. Structural genes of lac operon has the following sequence

A. A, Y, Z

B. Y, Z, A

C. Z, Y, A

D. Z, A, Y

Answer:



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16. At which level the control of gene expression takes place-

A. Translation

B. DNA replication

C. Elongation

D. Transcription

Answer:



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17. DNA profiling is done by -

A. VNTR

B. SSCP

C. AGCT

D. SCAR

Answer:



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18. One requires..... as a scientific key to understand biology of behaviour of humans.

A. Genetic Linkage

B. Genome

C. DNA probe

D. Blue print

Answer:



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19. Histone octomer is composed of
histones repeated twice.

A. H_1, H_2, H_3, H_4

B. H₂, H₃, H₄, H₅

C. H₁, H_{2a}, H_{2b}, H₃

D. H_{2a}, H_{2b}, H₃, H₄

Answer:



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20. Human Genome Project created a new field in biology called as-

A. Medical Microbiology

B. Genomics

C. Genetic Engineering

D. Bioinformatics

Answer:



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21. Which of the following is odd in reference to genetic code?

A. Valine

B. Tryptophan

C. Glycine

D. Alanine

Answer:



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22. State the correct sequences of techniques used during DNA fingerprinting? (i) Gel electrophoresis (ii) Southern blotting (iii) Cell fractionation (iv) Autoradiography

A. (i), (ii), (iii), (iv)

B. (iii), (i), (ii), (iv)

C. (iv), (i), (ii), (iii)

D. (iii), (iv), (i), (ii)

Answer:



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23. Which of the following is wrongly matched?

A. Operon- Structural genes, Operator and promoter

B. Repressor proteins - Binds to operator to stop enzyme synthesis

C. Transcription - Writing information from DNA to tRNA

D. Translation- Using information in mRNA to make protein.

Answer:



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24. Which one of the codon is not an indicator of completion of protein synthesis-

A. UAG

B. AUG

C. UAA

D. UGA

Answer:



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25. Nucleosome contains- (i) RNA (ii) DNA (iii)

Histones (iv) All of these

A. (i), (iii)

B. (i), (ii), (iii), (iv)

C. (ii), (iii)

D. (i), (ii), (iii)

Answer:



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26. Transcription and translation of a gene composed of 30 nucleotides would form a protein containing.....

A. 90

B. 60

C. 15

D. 10

Answer:



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27. Nucleosome core consists of

A. H_1 and H_3

B. H_3 and H_4

C. H_2A , H_2B , H_3 and H_4

D. H_1 , H_2 , H_3 and H_4

Answer:



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28. DNA replication is a

A. Conservative

B. Semi-conservative

C. Destructive

D. semi-destructive

Answer:



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29. Which of the following has the longest DNA sequences?

A. VNTRs

B. STRs

C. SNPs

D. RFLPs

Answer:



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30. Name the process involved in DNA fragmentation.



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31. Name two types of maps generated by HGP.

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32. What is translocation?

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33. What are promoters?



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34. Enlist the characteristics of genetic code.

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37. Write a note on applications of DNA finger printing.



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38. Write a note on Human Genome Project (HGP).



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39. Explain briefly S phase.



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40. Describe translation in protein synthesis.



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41. Explain DNA fingerprinting.



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