BIOL-8 Practice Test 03

Module 7: Genetics (DNA, RNA, Protein Synthesis)

Instructions: This practice test covers material from Module 7. Answer all questions to the best of your ability.

Part A: Multiple Choice

Module 7: Genetics & the Central Dogma

1. Which molecule carries the genetic instructions for building an organism? A) RNA B) Protein C) DNA D) Lipid

2. What are the four bases found in DNA? A) Adenine, Uracil, Guanine, Cytosine B) Adenine, Thymine, Guanine, Cytosine C) Alanine, Threonine, Glycine, Cysteine D) Adenine, Thymine, Glucose, Cytosine

3. In DNA, Adenine (A) always pairs with: A) Cytosine (C) B) Guanine (G) C) Thymine (T) D) Uracil (U)

4. What makes up the "backbone" of a DNA molecule? A) Nitrogenous bases B) Amino acids C) Sugar and phosphate groups D) Hydrogen bonds

5. DNA replication is described as "semiconservative" because: A) Only half the DNA is copied B) Each new DNA molecule contains one old strand and one new strand C) It happens in half the time of transcription D) It requires no enzymes

6. Which enzyme unzips the DNA double helix during replication? A) DNA Polymerase B) Ligase C) Helicase D) RNA Polymerase

7. The Central Dogma describes the flow of genetic information as: A) Protein → RNA → DNA B) DNA → RNA → Protein C) RNA → DNA → Protein D) DNA → Protein → RNA

8. What is the process of making an mRNA copy from DNA called? A) Translation B) Replication C) Transcription D) Mutation

9. Where does transcription take place in a eukaryotic cell? A) Ribosome B) Cytoplasm C) Nucleus D) Golgi apparatus

10. Which nitrogenous base is found in RNA but NOT in DNA? A) Adenine B) Cytosine C) Guanine D) Uracil

11. What is the mRNA sequence produced from this DNA template: **3′–TAC GGA–5′**? A) 5′–ATG CCT–3′ B) 5′–AUG CCU–3′ C) 5′–UTC CCU–3′ D) 5′–AUG GGA–3′

12. Translation is the process of: A) Copying DNA into two new molecules B) Making mRNA from a DNA template C) Building a protein from an mRNA code D) Folding a protein into its final shape

13. Where does translation occur in the cell? A) Nucleus B) Mitochondria C) Ribosome D) Smooth ER

14. A three-nucleotide sequence on mRNA that codes for one amino acid is called a: A) Gene B) Codon C) Anticodon D) Chromosome

15. The job of tRNA during translation is to: A) Carry the genetic code out of the nucleus B) Form the body of the ribosome C) Bring the correct amino acid to the ribosome D) Unzip the DNA double helix

16. A mutation that changes one nucleotide but does NOT change the amino acid is called a: A) Missense mutation B) Nonsense mutation C) Silent mutation D) Frameshift mutation

17. Which type of mutation usually causes the most damage to the resulting protein? A) Silent mutation B) A substitution of the third base in a codon C) Frameshift mutation (insertion or deletion) D) Point mutation at the very end of a gene

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Part B: Fill in the Blank

18. The sugar found in DNA is ___, while the sugar in RNA is ___.

19. The enzyme that builds the new DNA strand during replication is ___.

20. The flow of information from DNA → mRNA is called ___.

21. The three-letter mRNA sequence **AUG** is known as the ___ codon and codes for the amino acid methionine.

22. ___ are the building blocks (monomers) of proteins.

Part C: Short Answer

23. List three structural differences between DNA and RNA.

24. Describe the specific roles of mRNA, tRNA, and rRNA in protein synthesis.

25. A DNA coding strand reads **ATG–CCC–GAT**. Write the mRNA sequence. Then, using a codon chart, identify the amino acid sequence.

26. Why is a frameshift mutation (an insertion or deletion) usually more harmful than a simple substitution mutation?

End of Practice Test 03