

Advanced Genetic Fundamentals

Genetics · Answer Key · 10 Questions

1. Which specific enzyme is responsible for the removal of RNA primers and their replacement with DNA nucleotides during prokaryotic DNA replication?

- A) DNA Polymerase III
- B) DNA Polymerase I**
- C) Primase
- D) Helicase

2. In the context of epigenetics, which residue is most commonly methylated to silence gene expression in mammals?

- A) Cytosine**
- B) Adenine
- C) Guanine
- D) Thymine

3. What is the term for a permanent change in the DNA sequence that does not result in a change to the amino acid sequence of the protein?

- A) Missense mutation
- B) Nonsense mutation
- C) Silent mutation**
- D) Frameshift mutation

4. Which phase of meiosis is characterized by the separation of sister chromatids to opposite poles of the cell?

- A) Anaphase I
- B) Prophase II
- C) Metaphase II
- D) Anaphase II**

5. The 'Wobble Hypothesis,' proposed by Francis Crick, explains the degeneracy of the genetic code by focusing on the flexibility of pairing between which two components?

- A) Codon and Anticodon**
- B) Ribosome and mRNA
- C) tRNA and rRNA
- D) Intron and Exon

6. What is the function of the Shine-Dalgarno sequence in prokaryotic mRNA?

- A) Termination of transcription
- B) Binding site for ribosomes**
- C) Splicing of introns
- D) Promotion of DNA methylation

7. Which structural motif found in DNA-binding proteins is characterized by two alpha-helices joined by a short loop?

- A) Leucine zipper
- B) Zinc finger
- C) Helix-turn-helix**
- D) Beta-sheet

8. What specific type of chromosomal mutation involves a segment of DNA breaking off and reattaching to the same chromosome in reverse orientation?

- A) Translocation
- B) Duplication
- C) Inversion**
- D) Deletion

9. In the Hardy-Weinberg principle, which variable represents the frequency of the recessive allele in a population?

- A) p
- B) q**
- C) p^2
- D) $2pq$

10. Which process involves the formation of a polytene chromosome in certain dipteran larvae, resulting from multiple rounds of DNA replication without cell division?

- A) Endoreduplication**
- B) Meiosis
- C) Binary fission
- D) Transformation