Advanced Genetic Fundamentals

Genetics · Answer Key · 12 Questions

1. Which specific protein complex is responsible for loading the cohesin ring onto sister chromatids during the S phase of the cell cycle?

A) Scc2/Scc4 (NIPBL/MAU2)
B) Smc1/Smc3
C) Pds5
D) Wapl

2. In the context of DNA replication, which DNA polymerase is primarily responsible for lagging strand synthesis in eukaryotic cells?

A) DNA polymerase alpha
B) DNA polymerase delta
C) DNA polymerase epsilon
D) DNA polymerase beta

3. What is the specific term for the phenomenon where a gene's expression is dependent upon whether it is inherited from the mother or the father due to epigenetic marking?

A) X-inactivation
B) Genetic imprinting
C) Paramutation
D) Dosage compensation

4. Which sequence in eukaryotic DNA acts as a specific binding site for the TATA-binding protein (TBP) during transcription initiation?

A) CAAT box
B) GC box
C) TATA box
D) Enhancer sequence

5. The enzyme responsible for relieving supercoiling stress ahead of the replication fork by creating transient double-strand breaks is known as what?

A) DNA Helicase
B) DNA Primase
C) Topoisomerase II
D) DNA Ligase

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6. Which of the following describes the 'Wobble' position in the context of the genetic code?

A) The third position of the codon
B) The first position of the anticodon
C) The second position of the amino acid
D) The terminal position of the poly-A tail

7. What is the chemical composition of the spliceosome, the complex responsible for removing introns from pre-mRNA?

A) Protein only
B) Lipid and protein
C) snRNPs and protein
D) DNA and RNA

8. Which histone protein is known as the 'linker' histone that stabilizes the DNA wrapped around the nucleosome core?

A) H2A
B) H2B
C) H3
D) H1

9. In the human genome, which type of repetitive element constitutes the largest portion of non-coding DNA?

A) LINEs
B) SINEs
C) Satellite DNA
D) Telomeric repeats

10. The process by which bacterial cells take up naked DNA fragments from their environment is specifically called what?

A) Transduction
B) Conjugation
C) Transformation
D) Transfection

11. Which of the following chromosomal aberrations involves the movement of a segment of one chromosome to a non-homologous chromosome?

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

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12. What is the primary function of the enzyme aminoacyl-tRNA synthetase?

A) Joining Okazaki fragments

B) Charging tRNA with the correct amino acid

C) Synthesizing ribosomal RNA

D) Unwinding the DNA double helix

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