

Q1. The transforming principle in Griffith's experiment was later identified as:

- A. RNA
- B. DNA
- C. Protein
- D. Lipid

Answer: B

Explanation: Avery, MacLeod, and McCarty proved that DNA was the genetic material responsible for transformation in Griffith's experiment.

Q2. Which base is not present in RNA?

- A. Adenine
- B. Cytosine
- C. Uracil
- D. Thymine

Answer: D

Explanation: Thymine is present in DNA, while RNA has uracil instead.

Q3. Which of the following statements is true about the double helix model of DNA?

- A. The two strands run parallel
- B. Bases face outward, and sugar-phosphate backbone is inward
- C. Each turn of helix contains approximately 10 base pairs
- D. A pairs with C, and G pairs with T

Answer: C

Explanation: In B-DNA, each turn has about 10 base pairs. Strands are antiparallel, and base pairing follows A-T and G-C rules.

Q4. If a DNA segment has 120 adenine bases, how many guanine bases will it have in double-stranded form?

- A. 120
- B. 240
- C. Cannot be determined
- D. Equal to cytosine bases

Answer: D

Explanation: A pairs with T and G pairs with C. So guanine amount will equal cytosine, but not predictable from adenine count alone.

Q5. Which enzyme is responsible for unzipping DNA during replication?

- A. DNA ligase
- B. Helicase
- C. Topoisomerase
- D. Primase

Answer: B

Explanation: Helicase breaks hydrogen bonds between bases to separate DNA strands.

Q6. In prokaryotes, the site of transcription initiation is recognized by:

- A. Sigma factor
- B. DNA polymerase
- C. Promoter
- D. Enhancer

Answer: A

Explanation: The sigma factor helps RNA polymerase bind to the promoter region in prokaryotes.

Q7. Which component is added to mRNA during post-transcriptional processing in eukaryotes?

- A. Capping at 5' end
- B. Removal of exons
- C. Removal of 5' cap
- D. DNA primer

Answer: A

Explanation: A 7-methyl guanosine cap is added to the 5' end to protect mRNA and assist in translation.

Q8. Which enzyme joins Okazaki fragments on the lagging strand during replication?

- A. DNA polymerase I
- B. DNA ligase
- C. Helicase
- D. Primase

Answer: B

Explanation: DNA ligase seals nicks between Okazaki fragments on the lagging strand.

Q9. Which of the following statements about genetic code is false?

- A. It is triplet
- B. It is universal with few exceptions
- C. It is overlapping
- D. It is degenerate

Answer: C

Explanation: The genetic code is non-overlapping; each codon is read separately.

Q10. In *E. coli*, if lactose is present but glucose is absent, which of the following occurs?

- A. Lac operon is turned off
- B. Repressor binds to operator
- C. RNA polymerase binds to promoter and transcription occurs
- D. CAP-cAMP complex is inactive

Answer: C

Explanation: In absence of glucose, the CAP-cAMP complex activates transcription of the lac operon when lactose is present.

Q11. Which of the following RNAs has a clover-leaf structure and carries amino acids during translation?

- A. mRNA
- B. rRNA
- C. tRNA
- D. hnRNA

Answer: C

Explanation: tRNA has a cloverleaf secondary structure and carries specific amino acids to the ribosome during protein synthesis.

Q12. Match the following terms with their correct description:

Column I

- A. Exons
- B. Introns
- C. Spliceosome
- D. hnRNA

Column II

- i. Non-coding regions removed
- ii. Coding segments retained in mRNA
- iii. Splicing complex
- iv. Initial transcript in eukaryotes

Options:

- A. A-ii, B-i, C-iii, D-iv
- B. A-i, B-ii, C-iv, D-iii
- C. A-iv, B-i, C-ii, D-iii
- D. A-iii, B-ii, C-iv, D-i

Answer: A

Explanation: Exons are coding, introns are removed, hnRNA is the precursor, and spliceosome carries out splicing.

Q13. Assertion (A): The DNA strands in a helix are antiparallel.

Reason (R): One strand is in 5' to 3' direction, and the other is in 3' to 5'.

- A. Both A and R are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A
- C. A is true, R is false
- D. A is false, R is true

Answer: A

Explanation: The antiparallel nature of DNA refers to opposite directional polarity of the strands (5'→3' and 3'→5').

Q14. Identify the correct sequence of events in transcription in a eukaryotic cell:

- A. Elongation → Termination → Initiation
- B. Initiation → Termination → Elongation
- C. Initiation → Elongation → Termination
- D. Termination → Elongation → Initiation

Answer: C

Explanation: Transcription starts with initiation, followed by elongation and ends with termination.

Q15. Which of the following correctly identifies the direction of synthesis during DNA replication?

- A. Leading strand: 3' → 5', Lagging strand: 5' → 3'
- B. Both strands: 3' → 5'
- C. Both strands: 5' → 3'
- D. Leading and lagging strands both synthesized in 5' → 3' direction

Answer: D

Explanation: DNA polymerase adds nucleotides only in the 5' to 3' direction, even on the lagging strand (via Okazaki fragments).

Q16. Which of the following enzymes is required to unwind the DNA helix during replication?

- A. DNA polymerase
- B. Ligase
- C. Helicase
- D. Topoisomerase

Answer: C

Explanation: Helicase unwinds the double-stranded DNA ahead of the replication fork.

Q17. The function of DNA ligase in DNA replication is to:

- A. Remove primers
- B. Seal nicks between Okazaki fragments
- C. Proofread errors
- D. Unwind the DNA helix

Answer: B

Explanation: DNA ligase joins the discontinuous Okazaki fragments on the lagging strand.

Q18. Which of the following is not a component of a nucleosome?

- A. Histone H1
- B. Histone H2A
- C. Histone H3
- D. RNA

Answer: D

Explanation: Nucleosomes are composed of DNA wrapped around histone proteins; RNA is not part of nucleosome structure.

Q19. Which of the following statements regarding genetic code is incorrect?

- A. It is universal
- B. It is unambiguous
- C. It is overlapping
- D. It is triplet in nature

Answer: C

Explanation: The genetic code is non-overlapping, i.e., each nucleotide is read only once in a triplet.

Q20. Which of the following codons is known as a start codon?

- A. UAG
- B. UAA
- C. AUG
- D. UGA

Answer: C

Explanation: AUG acts as a start codon and codes for methionine.

Q21. In the process of translation, the formation of peptide bond is catalyzed by:

- A. Ribosomal protein
- B. tRNA
- C. Peptidyl transferase
- D. DNA polymerase

Answer: C

Explanation: Peptidyl transferase, a ribozyme present in the large ribosomal subunit, forms peptide bonds.

Q22. Identify the correct statement:

- A. The anticodon is present on mRNA
- B. Codon and anticodon are identical
- C. tRNA has an anticodon that pairs with mRNA codon
- D. Ribosomes read DNA directly

Answer: C

Explanation: tRNA has an anticodon loop that recognizes and base pairs with the codon on mRNA.

Q23. Choose the correct match between scientist and their contribution:

- A. Meselson-Stahl – DNA repair
- B. Griffith – Transformation
- C. Hershey and Chase – Transcription
- D. Chargaff – Translation

Answer: B

Explanation: Griffith discovered the phenomenon of bacterial transformation using *Streptococcus pneumoniae*.

Q24. What is the primary transcript formed in eukaryotes called?

- A. mRNA
- B. hnRNA
- C. tRNA
- D. rRNA

Answer: B

Explanation: hnRNA (heterogeneous nuclear RNA) is the initial transcript before splicing.

Q25. Which of the following statements about DNA replication is correct?

- A. It occurs in the S phase of mitosis
- B. It is conservative
- C. It requires RNA primers
- D. It can proceed without enzymes

Answer: C

Explanation: Short RNA primers are synthesized by primase to initiate DNA replication.

Q26. Assertion (A): Genetic code is said to be degenerate.

Reason (R): Some amino acids are coded by more than one codon.

- A. Both A and R are true, and R is the correct explanation
- B. Both A and R are true, but R is not the correct explanation
- C. A is true, R is false
- D. A is false, R is true

Answer: A

Explanation: The genetic code is degenerate because multiple codons can code for the same amino acid.

Q27. Identify the correct pair:

- A. Okazaki fragments – Continuous synthesis
- B. Template strand – Coding strand
- C. DNA polymerase – 3' to 5' synthesis
- D. Lagging strand – Discontinuous synthesis

Answer: D

Explanation: The lagging strand is synthesized in short fragments (Okazaki fragments) in a discontinuous manner.

Q28. Which one is not true for the genetic code?

- A. It is nearly universal
- B. It is commaless
- C. It has no start and stop signals
- D. It is degenerate

Answer: C

Explanation: The genetic code has specific start (AUG) and stop codons (UAG, UAA, UGA).

Q29. Match the scientists with their discoveries:

Column I

- A. Meselson and Stahl
- B. Hershey and Chase
- C. Watson and Crick
- D. Beadle and Tatum

Column II

- i. DNA is the genetic material
- ii. One gene-one enzyme
- iii. Semi-conservative replication
- iv. Double helix model

Options:

- A. A-iii, B-i, C-iv, D-ii
- B. A-ii, B-iii, C-i, D-iv
- C. A-i, B-ii, C-iii, D-iv
- D. A-iv, B-iii, C-ii, D-i



Answer: A

Explanation: All matches are correct based on key experimental findings in molecular biology.

Q30. Which one of the following is transcribed but not translated?

- A. mRNA
- B. tRNA
- C. DNA
- D. Protein

Answer: B

Explanation: tRNA is transcribed from DNA but does not code for a protein.

Q31. Which of the following RNAs is most abundant in a cell?

- A. mRNA
- B. tRNA
- C. rRNA
- D. snRNA

Answer: C

Explanation: rRNA makes up about 80% of total RNA in a cell and is a structural component of ribosomes.

Q32. The DNA strand that acts as a template for mRNA synthesis is known as:

- A. Coding strand
- B. Non-template strand
- C. Sense strand
- D. Antisense strand

Answer: D

Explanation: The antisense strand (template strand) serves as the template for RNA synthesis.

Q33. Which of the following is not required for translation?

- A. mRNA
- B. DNA
- C. tRNA
- D. Ribosome

Answer: B

Explanation: Translation occurs in the cytoplasm using mRNA, tRNA, amino acids, and ribosomes — not DNA.

Q34. Assertion (A): Splicing is required in eukaryotic gene expression.

Reason (R): Eukaryotic genes contain exons and introns.

- A. Both A and R are true, and R is the correct explanation
- B. Both A and R are true, but R is not the correct explanation
- C. A is true, R is false
- D. A is false, R is true

Answer: A

Explanation: Introns are removed and exons are joined in eukaryotic RNA through splicing.

Q35. Which process in eukaryotes ensures that mature mRNA is protected and stable before leaving the nucleus?

- A. Capping and tailing
- B. Splicing
- C. Transcription
- D. Translation

Answer: A

Explanation: 5' capping and 3' polyadenylation (tailing) stabilize the mRNA molecule.

Q36. Which of the following enzymes catalyzes transcription in eukaryotes?

- A. DNA polymerase
- B. RNA polymerase I
- C. RNA polymerase II
- D. DNA ligase

Answer: C

Explanation: RNA polymerase II transcribes mRNA in eukaryotic cells.

Q37. Which of the following statements is incorrect about lac operon?

- A. It is found in prokaryotes
- B. It is an inducible operon
- C. It is always switched on
- D. It is regulated by a repressor protein

Answer: C

Explanation: Lac operon is normally off and only induced in the presence of lactose.

Q38. Match the following:

Column I

- A. Exonuclease
- B. DNA helicase
- C. DNA polymerase
- D. Ligase

Column II

- i. Forms phosphodiester bonds
- ii. Removes mismatched nucleotides
- iii. Unwinds the DNA helix
- iv. Adds nucleotides during replication

Options:

- A. A-ii, B-iii, C-iv, D-i
- B. A-iv, B-ii, C-i, D-iii
- C. A-i, B-iv, C-ii, D-iii
- D. A-iii, B-i, C-iv, D-ii

Answer: A

Explanation: All enzyme functions are correctly matched.

Q39. The gene regulatory protein that prevents transcription in the lac operon is:

- A. Operator
- B. Inducer
- C. Repressor
- D. Promoter

Answer: C

Explanation: The repressor binds to the operator region and inhibits transcription unless lactose is present.

Q40. Which RNA does not participate directly in protein synthesis?

- A. mRNA
- B. tRNA

- C. rRNA
- D. hnRNA

Answer: D

Explanation: hnRNA is the precursor of mRNA and is processed before translation.

Q41. Which of the following statements about DNA replication is false?

- A. It begins at multiple origins in eukaryotes
- B. It is bidirectional
- C. Leading strand is synthesized continuously
- D. Lagging strand is synthesized in 5' to 3' direction continuously

Answer: D

Explanation: Lagging strand is synthesized discontinuously as Okazaki fragments, not continuously.

Q42. Which of the following steps occurs first during transcription?

- A. Chain elongation
- B. Promoter binding
- C. RNA splicing
- D. Chain termination

Answer: B

Explanation: RNA polymerase binds to the promoter to initiate transcription.

Q43. Which of the following features makes genetic code unambiguous?

- A. Each codon codes for multiple amino acids
- B. Each amino acid has one codon only
- C. One codon codes for only one amino acid
- D. Stop codons code for amino acids

Answer: C

Explanation: Each codon codes for a specific amino acid, making the code unambiguous.

Q44. The enzyme involved in removing RNA primers and replacing them with DNA in prokaryotes is:

- A. DNA polymerase I
- B. DNA polymerase III
- C. Ligase

D. Primase

Answer: A

Explanation: DNA polymerase I removes RNA primers and fills gaps with DNA.

Q45. Which of the following is a feature of prokaryotic gene regulation but not of eukaryotic gene regulation?

- A. Presence of operons
- B. Transcription factors
- C. Enhancer elements
- D. Chromatin remodeling

Answer: A

Explanation: Operons (like the lac operon) are a feature of prokaryotic gene regulation.