

Molecular Basis of Inheritance — CBSE Pattern Test 2

Class 12 Biology · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 2 — CBSE Pattern (90 minutes, 40 marks)

Class 12 Biology · Molecular Basis of Inheritance · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.
(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.
(3) For MCQ questions choose the single correct option; for VSA answers write a single line.
(4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

- The transforming principle was identified by
 - Avery, MacLeod and McCarty
 - Mendel
 - Darwin
 - Watson
- The genetic code is
 - triplet
 - doublet
 - singlet
 - quadruplet
- The repressor of the lac operon is coded by the
 - i gene
 - z gene
 - y gene
 - a gene
- DNA fingerprinting was developed by
 - Alec Jeffreys
 - Watson
 - Crick
 - Morgan
- The enzyme coded by the z gene is
 - beta-galactosidase
 - permease
 - transacetylase
 - repressor
- The strand that is copied is the
 - template strand
 - coding strand
 - lagging strand
 - leading strand
- DNA replication is
 - semi-conservative

- (B) conservative
 - (C) dispersive
 - (D) non-conservative
8. Translation occurs on the
- (A) ribosome
 - (B) nucleus
 - (C) mitochondria
 - (D) Golgi body
9. What is transcription?
10. Name the stop codons.

Section B — Short Answer I ($4 \times 2 = 8$ marks)

11. What is the pitch of the DNA helix?
12. Which enzyme unwinds DNA?
13. What is mRNA processing?
14. What is a promoter?

Section C — Short Answer II ($4 \times 3 = 12$ marks)

15. Describe the process of transcription in prokaryotes.
16. Describe the process of translation.
17. State Chargaff's rule and explain base pairing.
18. Describe semi-conservative replication with experimental proof.

Section D — Long Answers ($2 \times 5 = 10$ marks)

19. (a) Compare DNA and RNA as genetic material. (b) Describe the process of translation.
20. (a) Describe the principle and applications of DNA fingerprinting. (b) Explain the regulation of the lac operon.

Answer Key (Marking Scheme)

- Q1 — (A) Avery, MacLeod and McCarty. Q2 — (A) triplet. Q3 — (A) i gene. Q4 — (A) Alec Jeffreys. Q5 — (A) beta-galactosidase. Q6 — (A) template strand. Q7 — (A) semi-conservative. Q8 — (A) ribosome.
- Q9 — Transcription is the synthesis of RNA from a DNA template.
- Q10 — UAA, UAG and UGA.
- Q11 — 3.4 nm (one complete turn).
- Q12 — Helicase.
- Q13 — The processing of hnRNA into mature mRNA (capping, tailing and splicing).
- Q14 — A DNA sequence where RNA polymerase binds to begin transcription.
- Q15 — RNA polymerase with the sigma factor binds the promoter and synthesises mRNA until the terminator.
- Q16 — The ribosome reads mRNA codons; tRNA brings amino acids; peptide bonds form.
- Q17 — A = T and G = C in double-stranded DNA.
- Q18 — Each new DNA molecule has one old and one new strand; proved by the Meselson-Stahl experiment.

Q19 — (a) DNA: stable, double-stranded, thymine; RNA: less stable, catalytic. (b) Initiation, elongation and termination on the ribosome.

Q20 — (a) Uses satellite DNA repeat variability; used in forensics and paternity testing. (b) The repressor blocks the operator; lactose induces the operon.