

Principles of Inheritance and Variation — 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 · Principles of Inheritance and Variation · 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 law of segregation is also called the law of
 - purity of gametes
 - dominance
 - independent assortment
 - linkage
- The number of possible blood groups in humans is
 - four
 - two
 - three
 - six
- Sex-linked disorders are carried on the
 - X chromosome
 - autosomes
 - Y chromosome only
 - mitochondria
- In a pedigree, a circle represents a
 - female
 - male
 - affected male
 - carrier
- Sickle-cell anaemia is a
 - Mendelian disorder
 - chromosomal disorder
 - sex-linked disorder
 - co-dominant trait
- A test cross uses the
 - recessive parent
 - dominant parent
 - F1
 - F2
- Co-dominance is seen in the
 - AB blood group

- (B) O blood group
 - (C) A blood group
 - (D) B blood group
8. In humans, the male is
- (A) XY
 - (B) XX
 - (C) XO
 - (D) YY
9. State the law of segregation.
10. What is co-dominance?

Section B — Short Answer I (4 × 2 = 8 marks)

11. What is a carrier?
12. Give two examples of Mendelian disorders.
13. What is linkage?
14. What is the karyotype in Klinefelter's syndrome?

Section C — Short Answer II (4 × 3 = 12 marks)

15. Explain the law of independent assortment with an example.
16. How does the ABO blood group show multiple alleles?
17. Explain the inheritance of haemophilia.
18. Explain Down's syndrome.

Section D — Long Answers (2 × 5 = 10 marks)

19. (a) Explain incomplete dominance and co-dominance with examples. (b) Explain the chromosomal theory of inheritance.
20. (a) Describe pedigree analysis with symbols. (b) Explain the inheritance of sickle-cell anaemia.

Answer Key (Marking Scheme)

- Q1 — (A) purity of gametes. Q2 — (A) four. Q3 — (A) X chromosome. Q4 — (A) female. Q5 — (A) Mendelian disorder. Q6 — (A) recessive parent. Q7 — (A) AB blood group. Q8 — (A) XY.
- Q9 — Alleles segregate without mixing during gamete formation.
- Q10 — Co-dominance is the full expression of both alleles in the heterozygote.
- Q11 — A heterozygous individual that carries a recessive allele but shows no symptoms.
- Q12 — Haemophilia and sickle-cell anaemia.
- Q13 — The tendency of genes on the same chromosome to be inherited together.
- Q14 — 47, XXY.
- Q15 — Alleles of different genes assort independently; dihybrid F₂ = 9:3:3:1.
- Q16 — Three alleles I^A, I^B and i give four phenotypes (A, B, AB, O).
- Q17 — X-linked recessive; a female carrier transmits it to about half her sons.
- Q18 — Trisomy of chromosome 21 (47 chromosomes), causing intellectual disability and characteristic features.

Q19 — (a) Incomplete dominance: intermediate phenotype; co-dominance: both alleles express. (b) Genes are located on chromosomes and their behaviour parallels chromosomes during meiosis.

Q20 — (a) Circles = females, squares = males, shaded = affected, half-shaded = carrier. (b) Autosomal recessive; valine replaces glutamic acid in beta-globin.