

Principles of Inheritance and Variation — CBSE Pattern Test 1

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

Test 1 — 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 phenotypic ratio of a dihybrid cross is
 - 9:3:3:1
 - 3:1
 - 1:2:1
 - 1:1
- In snapdragon, incomplete dominance gives the F₂ ratio
 - 1:2:1
 - 3:1
 - 9:3:3:1
 - 1:1
- The ABO blood group system is an example of
 - multiple alleles
 - linkage
 - polygenic inheritance
 - sex linkage
- Haemophilia is a
 - sex-linked recessive disorder
 - autosomal dominant disorder
 - chromosomal disorder
 - co-dominant trait
- Down's syndrome is caused by
 - trisomy of 21
 - monosomy of X
 - XXY
 - XO
- Turner's syndrome has the karyotype
 - 45, XO
 - 47, XXY
 - 47, +21
 - 46, XY
- Klinefelter's syndrome has the karyotype
 - 47, XXY

- (B) 45, XO
 - (C) 47, +21
 - (D) 46, XX
8. Linkage was explained by
- (A) Morgan
 - (B) Mendel
 - (C) Darwin
 - (D) Watson
9. What is a test cross?
10. What is incomplete dominance?

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

11. State the law of dominance.
12. What are multiple alleles?
13. What is a pedigree analysis?
14. Give two examples of chromosomal disorders.

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

15. Differentiate between incomplete dominance and co-dominance.
16. Why is colour blindness more common in males?
17. Describe sex determination in humans.
18. Explain sickle-cell anaemia.

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

19. (a) State the law of independent assortment. (b) Explain it with a dihybrid cross.
20. (a) Explain linkage and recombination. (b) Describe Down's, Turner's and Klinefelter's syndromes.

Answer Key (Marking Scheme)

- Q1 — (A) 9:3:3:1. Q2 — (A) 1:2:1. Q3 — (A) multiple alleles. Q4 — (A) sex-linked recessive disorder. Q5 — (A) trisomy of 21. Q6 — (A) 45, XO. Q7 — (A) 47, XXY. Q8 — (A) Morgan.
- Q9 — A cross with the recessive parent to determine the genotype of the dominant individual.
- Q10 — Incomplete dominance is the intermediate phenotype of the heterozygote.
- Q11 — In a heterozygous pair, only the dominant factor is expressed.
- Q12 — More than two alleles for a gene in a population (e.g. ABO blood group).
- Q13 — The study of inheritance of a trait across generations using a family tree.
- Q14 — Down's syndrome and Turner's syndrome.
- Q15 — Incomplete dominance: intermediate phenotype; co-dominance: both alleles express fully.
- Q16 — Males have one X chromosome, so a single recessive allele causes the disorder.
- Q17 — Females are XX, males are XY; the male gamete determines the sex of the child.
- Q18 — Autosomal recessive disorder; glutamic acid is replaced by valine in the beta-globin chain.
- Q19 — (a) Alleles of different genes assort independently. (b) Dihybrid F₂ = 9:3:3:1.

Q20 — (a) Linked genes on the same chromosome are inherited together; crossing over gives recombinants. (b) Trisomy 21; XO female; XXY male.