



# CBSE Class 12 Biology

## Principles of Inheritance and Variation

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### Section 'A'

- Q.1.** Name one autosomal dominant and one autosomal recessive. Mendelian disorder in human.
- Q.2.** How many chromosomes do drones of honeybee possess? Name the type of cell division involved in the production of sperms by them.
- Q.3.** A single pea plant in your kitchen garden produces pods with viable seeds, but the individual papaya plant does not. Explain.
- Q.4.** A garden pea plant produced axial white flowers. Another of the same species produced terminal violet flowers. Identify the dominant traits.
- Q.5.** A garden pea plant produced axial white flowers. Another of the same species produced terminal violet flowers. Identify the dominant traits.
- Q.6.** Mention any two contrasting traits with respect to seeds in pea plant that were studied by Mendel.
- Q.7.** A single pea plant in your kitchen garden produces pods with viable seeds, but the individual papaya plant does not. Explain.
- Q.8.** Name the type of cross that would help to find the genotype of a pea plant bearing violet flowers.
- Q.9.** A geneticist interested in studying variations and patterns of inheritance in living beings prefers to choose organisms for experiments with shorter life cycle. Provide a reason.

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- Q.10. In Snapdragon, a cross between true-breeding red flowered (RR) plants and true-breeding white flowered (rr) plants showed a progeny of plants with all pink flowers.**
- (a) The appearance of pink flowers is not known as blending. Why?
- (b) What is the phenomenon known as?
- Q.11. Write the scientific name of the fruit-fly. Why did Morgan prefer to work with fruit-flies for his experiments? State any three reasons.**
- Q.12. Linkage and crossing-over of genes are alternatives of each other. Justify with the help of an example.**
- Q.13. How is 'stratification' represented in a forest ecosystem?**
- Q.14. State a difference between a gene and an allele.**
- Q.15. What are 'true breeding lines' that are used to study inheritance pattern of traits in plants?**
- Q.16. Give any two reasons for the selection of pea plants by Mendel for his experiments.**
- Q.17. A male honeybee has 16 chromosomes whereas, its female has 32 chromosomes. Give one reason.**
- Q.18. Name the event during cell division cycle that results in the gain or loss of chromosome.**
- Q.19. A garden pea plant (A) Produced inflated yellow pod, and another plant (B) of the same species produced constricted green pods. Identify the dominant traits.**
- Q.20. A test is performed to know whether the given plant is homozygous dominant or heterozygous. Name the test and phenotypic ratio of this test for a monohybrid cross.**
- Q.21. What is mutagen? Give an example?**

- Q.22.** Name the phenomena that occur when homologous chromosomes do not separate during meiosis.
- Q.23.** Which one change is the cause of sickle – cell anaemia ?
- Q.24.** Name any one plant & its feature that shows the phenomena of incomplete dominance?

## Section 'B'

- Q.25.** (i) Why are grasshopper and *Drosophila* said to show male heterogamity? Explain.
- (ii) Explain female heterogamity with the help of an example.
- Q.26.** During a monohybrid cross involving a tall pea plant with a dwarf pea plant, the offspring populations were tall and dwarf in equal ratio. Work out a cross to show how it is possible.
- Q.27.** A plant of *Antirrhinum majus* with red flowers was crossed with another plant of the same species with white flowers. The plants of the  $F_1$  generation bore pink flowers. Explain the pattern of inheritance with the help of a cross.
- Q.28.** A woman with blood group O married a man with AB group' Show the possible blood groups of the progeny. List the alleles involved in this inheritance'
- Q.29.** (a) A DNA segment has a total of 1000 nucleotides, out of which 240 of them are adenine containing nucleotides. How many pyrimidine bases this DNA segment possesses?
- (b) Draw a diagrammatic sketch of a portion of DNA segment to support your answer.
- Q.30.** Women are often blamed for producing female children. Consequently, they are ill-treated and ostracized. How will you address this issue scientifically? If you were to conduct an awareness programme to highlight the values involved?

- Q.31. Write the full form of VNTR. How is VNTR different from 'probe'?**
- Q.32. What is a test cross? How can it decipher the heterozygosity of a plant?**
- Q.33. In a cross between two tall pea plants some of the offsprings produced were dwarf. Show with the help of Punnett square how this is possible.**
- Q.34. In Snapdragon, a cross between true-breeding red flowered (RR) plants and true-breeding white flowered (rr) plants showed a progeny of plants with all pink flowers.**
- (a) The appearance of pink flowers is not known as blending. Why?
- (b) What is the phenomenon known as?
- Q.35. Differentiate between male and female heterogamety.**
- Q.36. How does the gene 'I' control ABO blood groups in humans? Write the effect the gene has on the structure of red blood cells.**
- Q.37. Write the types of sex-determination mechanisms the following crosses show. Give an example of each type.**
- (i) Female XY with Male XO
- (ii) Female ZW with Male ZZ
- Q.38. A cross was carried out between two pea plants showing the contrasting traits of height of the plant. The result of the cross showed 50% of parental characters.**
- (i) Work out the cross with the help of a Punnett square.
- (ii) Name the type of the cross carried out.
- Q.39. In a cross between two tall pea plants some of the offsprings produced were dwarf. Show with the help of Punnett square how this is possible.**
- Q.40. The human male never passes on the gene for haemophilia to his son. Why is it so?**

- Q.41. How does a test-cross help in identifying the genotype of the organism? Explain.**
- Q.42. Differentiate between point mutation and frameshift mutations.**
- Q.43. Give any two similarities between behavior of genes (Mendel's factor) during inheritance & chromosomes during cell division.**
- Q.44. The male fruit fly and female fowl are heterogametic while the female fruit fly and the male fowl are homogametic. Why are they called so?**
- Q.45. A man with blood group A married a woman with B group. They have a son with AB blood group and a daughter with blood group O. Work out the cross and show the possibility of such inheritance.**
- Q.46. How is the child affected if it has grown from the zygote formed by an XX-egg fertilized by Y-carrying sperm? What do you call this abnormality?**
- Q.47. The map distance in certain organism between genes A & B is 4 units, between B & C is units, & between C & D is 8 units which one of these gene paves will show more recombination frequency? Give reason.**

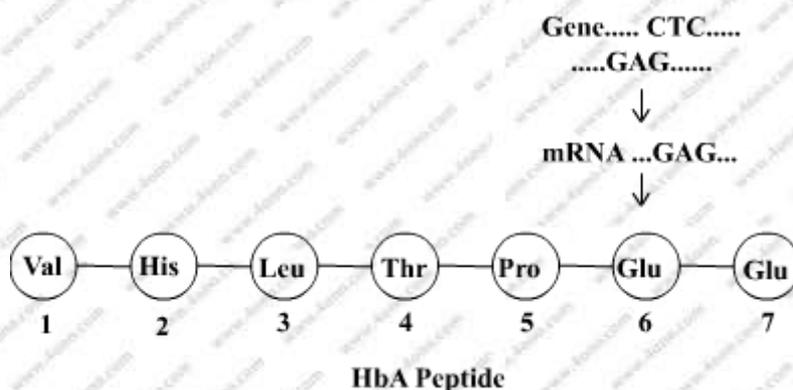


- Q.54. (a) Why is human ABO blood group gene considered a good example of multiple alleles?**  
**(b) Work out a cross up to F<sub>2</sub> generation only, between a mother with blood group A (Homozygous) and the father with blood group B (Homozygous). Explain the pattern of inheritance exhibited.**

- Q.55. A woman with O blood group marries a man with AB blood group**  
**(i) work out all the possible phenotypes and genotypes of the progeny.**  
**(ii) Discuss the kind of dominance in the parents and the progeny in this case.**

- Q.56. Explain the cause of Klinefelters syndrome. Give any four symptoms shown by sufferer of this syndrome.**

- Q.57. Given below is the representation of amino acid composition of the relevant Translated portion of  $\beta$ -chain of hemoglobin, related to the shape of human red Blood cells.**



- (a) Is this representation indicating a normal human or a sufferer from certain related genetic disease? Give reason in support of your answer.**  
**(b) What difference would be noticed in the phenotype of the normal and the sufferer related to this gene?**  
**(c) Who are likely to suffer more from the defect related to the gene represented the males, the females or both males and females equally? And why?**
- Q.58. In *Antirrhinum majus* a plant with red flowers was crossed with a plant with white flowers. Work out all the possible genotypes & phenotypes of F<sub>1</sub> & F<sub>2</sub> generations comment on the pattern of inheritance in this case?**
- Q.59. (a) Sickle celled anaemia in humans is a result of point mutation. Explain.**  
**(b) Write the genotypes of both the parents who have produced a sickle celled anaemic offspring.**

- Q.60.** Describe the mechanism of pattern of inheritance of ABO blood groups in humans.
- Q.61.** How are dominance, codominance and incomplete dominance patterns of inheritance different from each other?
- Q.62.** During the studies on genes in *Drosophila* that were sex-linked T.H. Morgan found F<sub>2</sub>-population phenotypic ratios deviated from expected g: B: B : 1. Explain the conclusion he arrived at.
- Q.63.** (a) Why are thalassemia and haemophilia categorized as Mendelian disorders? Write the symptoms of these diseases. Explain their pattern of inheritance in humans.  
(b) write the genotypes of the normal parents producing a haemophilic son.
- Q.64.** Recently a girl baby has been reported to suffer from hemophilia. How is it possible? Explain with the help of a cross.
- Q.65.** (a) Why is human ABO blood group gene considered a good example of multiple alleles?  
(b) Work out a cross up to F<sub>2</sub> generation only, between a mother with blood group A (Homozygous) and the father with blood group B (Homozygous). Explain the pattern of inheritance exhibited.
- Q.66.** Why is pedigree analysis done in the study of human genetics? State the conclusions that can be drawn from it.
- Q.67.** Identify 'a', 'b', 'c', 'd', 'e' and 'f' in the table given below:

| No. | Syndrome | Cause      | Characteristics of Affected individuals | Sex Male/ female/ Both |
|-----|----------|------------|---|------------------------|
| 1.  | Down's   | trisomy    | 'a' (i)<br>(ii)                         | 'b'                    |
| 2.  | 'C'      | XXY        | Overall masculine development           | 'd'                    |
| 3.  | Turner's | 45 with XO | 'e' (i)<br>(ii)                         | 'f'                    |

**Q.68.** During a medical investigation, an infant was found to possess an extra chromosome- 21. Describe the symptoms the child is likely to develop later in the life.

### Section 'D'

**Q.69.** A particular garden pea plant produces only violet flowers. Is it homozygous dominant for the trait or heterozygous?

(a) How would you ensure its genotype? Explain with the help of crosses.

**Q.70.** Explain the genetic basis of blood grouping in human population.

**Q.71.** A child suffering from Thalassemia is born to a normal couple. But the mother is being blamed by the family for delivering a sick baby.

(a) What is Thalassemia?

(b) How would you counsel the family not to blame the mother for delivering a child suffering from this disease? Explain.

(c) List the values your counselling can propagate in the families.

**Q.72.** (a) How does a chromosomal disorder differ from a Mendelian disorder?

(b) Name any two-chromosomal aberration associated disorders.

(c) List the characteristics of the disorders mentioned above that help in their diagnosis.

**Q.73.** A homozygous tall pea plant with green seeds is crossed with a dwarf pea plant with yellow seeds.

(i) What would be the phenotype and genotype of  $F_1$ ?

(ii) Work out the phenotypic ratio of  $F_2$  generation with the help of a Punnett square.

**Q.74.** (a) State the law of independent assortment.

(b) Using Punnett Square demonstrate the law of independent assortment in a cross involving two heterozygous parents.

**Q.75.** (a) Explain the process of DNA replication with the help of a schematic diagram.

(b) In which phase of the cell cycle does replication occur in Eukaryotes? What would happen if cell-division is not followed after DNA replication?



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