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**GRADE- XII-A PRINCIPLES OF INHERITANCE**

1. Name the pattern of inheritance where F1phenotype
(i) resembles only one of the two parents.
(ii) Does not resemble either of the two parents and is in between the two.

2. British geneticist RC Punnett developed a graphical representation of a genetic cross called ‘Punnett Square’. Mention the possible result this representation predicts of the genetic cross carried.

3. Name the type of cross that would help to find the genotype of a pea plant bearing violet flowers.

4. State a difference between a gene and an allele.

5. Give an example of polygenic trait in humans.

6. 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.

7. Mention any two contrasting traits with respect to seeds in pea plant that were studied by Mendel.

8. What are ‘true-breeding lines’ that are used to study inheritance pattern of traits in plants.

9. How many kinds of phenotype would you expect in F2-generation in a monohybrid cross exhibiting codominance?

10. Name the stage of cell division where segregation of an independent pair of chromosomes occurs.

11. 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.

12. A garden pea plant produced axial white flowers another of the same species produced terminal violet flowers. Identify the dominant traits.

13. The F2 progeny of a monohybrid cross showed phenotypic and genotypic ratio as 1 : 2 : 1, unlike that of Mendel’s monohybrid F2 ratio. With the help of a suitable example, work out a cross and explain how it is possible.

14. With the help of one example, explain the phenomena of codominance and multiple allelism in human population.

15. Linkage and crossing over of genes are alternatives of each other. Justify with the help of an example.

16. 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.
(i) The appearance of pink flowers is not known as blending. Why?
(ii) What is this phenomenon known as?

17. A cross was carried out between two pea plants showing the contrasting traits of height of the plants. The results of the cross showed 50% parental characters.
(i) Work out the cross with the help of a Punnett square.
(ii) Name the type of the cross carried out

18. How does the gene T control ABO blood group in humans? Write the effect the gene has on the structure of red blood cells.

19. Identify in which of the crosses, the strength of linkage between the genes is higher. Give reasons in support of your answer.

20. A cross between a red flower bearing plant and a white flower bearing plant of Antirrhinum produced all plants having pink flowers. Work out a cross to explain how this is possible.

21. Work out a cross to find the genotype of a tall pea plant. Name the type of cross.

22. Differentiate between multiple allelism and pleiotropy with the help of an example of each.

23. 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.

23. In a typical monohybrid cross, the F2 population ratio is written as 3 : 1 for phenotype, but expressed as 1 : 2 : 1 for genotype. Explain with the help of an example.

24. How is the phenotypic ratio of F2-generation in a dihybrid cross is different from monohybrid cross?

25. In a dihybrid cross, white-eyed, yellow-bodied female Drosophila crossed with red-eyed, brown-bodied male Drosophila produced in F2-generation 1.3% recombinants and 98.7% progeny with parental type combinations. This observation of Morgan deviated from Mendelian F2-phenotypic dihybrid ratio. Explain, giving reasons Morgan’s observation.

26. Explain the phenomena of dominance, multiple allelism and codominance taking human ABO blood group as an example.

27. Compare in any three ways the chromosomal theory of inheritance as proposed by Sutton and Bovery with that of experimental results on pea plant presented by Mendel.

28. (i) Explain linkage and recombination as put forth by TH Morgan based on his observations with Drosophila melanogaster crossing experiment.
(ii) Write the basis on which Alfred Sturtevant explained gene mapping.

29. What is a test cross? How can it decipher the heterozygosity of a plant?

30. How would you find genotype of a tall pea plant bearing white flowers? Explain with the help of a cross. Name the type of cross you would use.

31. Although Mendel published his work on inheritance of characters in 1865 but for several reasons, it remained unrecognised till 1900. Explain giving three reasons, why did it take so long.

32. A teacher wants his/her students to find the genotype of pea plants bearing purple coloured flowers in their school garden. Name and explain the cross that will make it possible.

33. 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.

34. Explain with the help of a suitable example, the inheritance of a trait where two different dominant alleles of a trait express themselves simultaneously in the progeny. Name this kind of inheritance pattern.

35. Explain polygenic inheritance with the help of a suitable example. (

36. Morgan carried out several dihybrid crosses in Drosophila and found F2 ratios deviated very significantly from the expected Mendelian ratio. Explain his finding with the help of an example.

37. (i) Write the conclusion Mendel arrived at on dominance of traits on the basis of monohybrid crosses that he carried out in pea plants.
(ii) Explain why a recessive allele is unable to express itself in a heterozygous state.

38. In pea plants, the colour of the flower is either violet or white, whereas human skin colour shows many gradation.
Explain giving reasons how it is possible.

39. A pea plant with purple flowers was crossed with white flowers producing all plants with only purple flowers. On selfing, these plants produced 482 plants with purple flowers and 162 with white flowers. What genetic mechanism accounts for these results? Explain.

40. Work out a cross between true breeding red and white flowered dog flower plants (snapdragon) upto F2 progeny. Explain the results of F1 and F2-generation.

41. (i) Write the scientific name of the organism Thomas Hunt Morgan and his colleagues worked with for their experiments.
Explain the correlation between linkage and recombination with respect to genes as studied by them.
(ii) How did Sturtevant explain gene mapping while working with Morgan?

42. Using Punnett square show the F2 result of a dihybrid cross where the pure breed parents have contrasting traits with reference to seed shape and seed colour in Pisum sativum. Give the phenotypic ratio.

43. (i) What is polygenic inheritance? Explain with the help of a suitable example.
(ii) How &re pleiotropy and Mendelian pattern of inheritance different from polygenic pattern of inheritance?

44. (i) A couple with blood group A and B, respectively have a child with blood group O. Work out a cross to show how it is possible and the probable blood groups that can be expected in their other offspring.
(ii) Explain the genetic basis of blood groups in human population.

45. (i) State and explain the law of segregation as proposed by Mendel in a monohybrid cross.
(ii) Write the Mendelian F2 phenotypic ratio in a dihybrid cross. State the law that he proposed on the basis of this ratio. How is this law different from the law of segregation?

46. Give a genetic explanation for the following cross. When a tall pea plant with round seeds was crossed with a dwarf pea plant with wrinkled seeds then all the individuals of F1-population were tall with round seeds. However, selfing among F1 population led to a 9 : 3 : 3 : 1 phenotypic ratio.

47. A cross was carried out between a pea plant heterozygous for round and yellow seeds with a pea plant having wrinkled and green seeds.
(i) Show the cross in a Punnett square.
(ii) Write the phenotype of the progeny of this cross.
(iii) What is this cross known as? State the purpose of conducting such a cross. (

48. (i) Differentiate between dominance and co-dominance.
(ii) Explain codominance taking an example of human blood groups in the population.

49. Differentiate between the following.
(i) Polygenic inheritance and pleiotropy.
(ii) Dominance, codominance and incomplete dominance.

50. (i) Explain monohybrid cross taking seed coat colour as a trait in Pisum sativum. Work out the cross up to F2-generation.
(ii) State the law of inheritance that can be derived from such a cross.
(iii) How is the phenotypic ratio of F2-generation different in a dihybrid cross?