



BIOLOGY

BOOKS - OSWAAL BIOLOGY

(KANNADA ENGLISH)

PRINCIPLES OF INHERITANCE AND VARIATIONS

**Topic 1 Mendel S Laws Of Inheritance Very Short
Answer Type Questions**

1. What is dominance? On with reference to the Mendelian laws of inheritance, define the term dominance.



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2. Define Law of dominance.



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3. What is the cross between F_1 hybrid and the recessive parent called?



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4. Mention the dihybrid test cross ratio.



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5. Give the phenotypic ratio of incomplete dominance.



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6. Name the first law of Mendel.



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7. What are alleles?



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8. Mention the phenotypic ratio of a dihybrid cross.



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9. If a diploid organism is heterozygous for 4 loci, how many types of gametes can be produced?



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10. Who had proposed the chromosomal theory of the inheritance?



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11. What is genetics?



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12. What is an allele?



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13. What is phenotype?



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14. What is genotype?



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15. What is recessiveness?



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16. Define test cross. What is its significance?



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17. Why is the blood group 'O' called as universal donor?



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18. Write the phenotypic ratio of Monohybrid Cross.



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19. What are multiple alleles? Give an example.



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20. What genetic principle could be derived from a monohybrid cross?



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21. Name any one plant and its feature that shows the phenomena of incomplete dominance?



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22. What is the genotypic ratio of incomplete dominance?



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23. State the law of independent assortment.



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24. Which of Mendel's Law of Inheritance is universally acceptable and without exception?

State the law.



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25. If the frequency of a parental form is higher than 25% in a dihybrid test cross, what does that indicate about the two genes involved?



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26. A man of A blood group marries a woman of AB blood group. Which type of progeny would indicate that man is heterozygous A?



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27. Write the possible genotypes Mendel got when he crossed F_1 tall pea plants with a dwarf pea plants



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28. Why, in a test cross, did Mendel cross a tall pea plant with a dwarf pea plant only?



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



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30. Name the respective pattern of inheritance where F_1 phenotype:
does not resemble either of the two parents
and is in between the two resembles only one
of the two parents.



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31. Who rediscovered Mendel's laws of heredity?



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32. On which plant did Mendel work?



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33. How many contrasting traits Mendel noted in garden pea?



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34. Mention any two of the seven contrasting traits noted by Mendel in garden pea.



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35. What are Mendel's hypothetical factors called in modern terminology?



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36. How many different genotypes are likely to be present in the human population?



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37. Also, how many phenotypes are possibly present?



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38. Write the scientific name of the organism that Morgan used for his linkage experiment.



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39. Why do certain genes tend to be inherited together in a cell at the time of cell division?



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40. What is linkage?



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41. Mention the possible blood groups of the progeny whose mother is heterozygous for

Group A and father is heterozygous for Group B.



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42. The phenotypic and genotypic ratios in F_2 generation are same in a certain kind of inheritance. Name an organism in which it occurs and mention the kind of inheritance involved.



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43. Name the type of inheritance in which the phenotypic and genotypic ratio are same. Also give the ratio.



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Topic 1 Mendel's Laws Of Inheritance Short Answer Type Questions I

1. What are the conclusions drawn by T.H. Morgan from the crossing experiment in *Drosophila* with respect to linkage?



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2. Differentiate between incomplete dominance and co-dominance.



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3. What are multiple alleles ? Why the alleles I^A and I^B for blood group are considered codominant ?



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4. In a family, the blood group of children are A and B. Mention the genotypes of the blood groups of their parents.



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5. Write the genotypes of blood group A and blood group B.



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6. List the antigens and antibodies of 'A' blood group and 'o' blood group?



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7. Mention the types of antigen and antibody present in different blood groups of man.



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8. Mention the possible blood groups of the progeny whose mother is heterozygous for

Group A and father is heterozygous for Group B.



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9. Differentiate homozygous individual from heterozygous individual.



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10. Differentiate between dominance and recessive genes.



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11. Mention one difference between monohybrid and dihybrid cross.



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12. Two heterozygous parents are crossed. If the two loci are linked what would be the distribution of phenotypic features in F₂ generation for a dihybrid cross?



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13. A progeny of F_1 is crossed with the homozygous recessive parent. What is this cross called? Work out how is it useful?



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14. In order to obtain the F_1 generation, Mendel pollinated a true-breeding, say, tall plant with a true-breeding dwarf plant. But for

getting the F_2 generation, he simply self-pollinated the tall F_1 plants. Why?



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15. A, B, D are three independently assorting genes with their recessive alleles a, b, d respectively. A cross was made between individuals of Aa bb DD genotype with aa bb dd. Explain the type of genotypes of the offspring produced.



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16. What is polygenic inheritance? Give an example



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17. What are multiple alleles? Give an example.



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18. Explain the following terms with examples:

(a) Co-dominance (b) Incomplete dominance.



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19. What is DNA polymorphism? Mention its significance.



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20. If you are given a tall pea plant, how would you find out its genotype? Explain.



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21. Define linkage. Who discovered linkage in *Drosophila*?



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22. What do you understand by phenotype and genotype? Explain by giving an example.



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23. Describe the situation in which independent assortment of genes results in 50% recombination.



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24. When a red flowered Antirrhinum plant was crossed with a white flowered Antirrhinum plant, the F_1 offspring had pink flowers.

Mention

(a) the genotype of F_1 plant, and

(b) the reason why it did not bear the parental red or white flower colours?



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25. If a true breeding homozygous pea plant with green pod and axial flowers as dominant characters is crossed with a recessive homozygous pea plant with yellow pods and terminal flowers, then what would be the :

Genotypes of the two parents

Phenotypes and genotypes of the F_1 offspring

Phenotypic and genotypes ratio in F_2 population



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26. Give two reasons why Mendel chose garden pea for his experiments. Give the biological name of this plant.



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27. State Mendel's law of segregation. Explain it with a suitable example.



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28. How do the back cross and test cross differ?



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29. Cite a case of incomplete dominance.

Which trait in such a case has no gene?



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30. A mother with blood group O has a foetus with blood group B. Will there be any problems in the mother or foetus ? If so, specify the problems.



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Topic 1 Mendel S Laws Of Inheritance Short Answer Type Questions li

1. By using Punnett square, schematically represent the hybrid cross experiment

conducted by Mendel using seed color and seed shape of pea as characters.



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2. Why Mendel's work was not recognized.?

Give any three reasons.



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3. What is incomplete dominance? Explain inheritance of flower colour in *Mirabilis jalapa*.



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4. Explain Mendel's dihybrid cross.



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5. Explain the law of independent assortment with a classical example.



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6. In monohybrid cross of red and white flower, Mendel got only red flower. On setting the F_1 plants having red flower he got both plants with red and white flower. Explain the basis of using RR and rr symbols to represent the genotype of plants of parental generation.



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7. In a Mendelian monohybrid cross the F_2 generation shows identical genotypic and

phenotypic ratios. What does it tell us about the nature of alleles involved? Justify your answer.



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8. In peas, tallness is dominant over dwarfness, and red colour of flowers is dominant over the white colour. When a tall plant bearing red flowers was pollinated by a dwarf plant bearing white flowers, the different phenotypic groups were obtained in the

progeny in numbers mentioned against them

Tall, Red = 138

Tall, White = 132

Dwarf, Red = 136

Dwarf, White = 128

Mention the genotypes of the two parents
and of the types of four offspring



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9. Write the comparison between the
behaviour of chromosomes and genes.



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10. Explain monohybrid test cross. Write its significance.



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11. In *Drosophila melanogaster*, the cross between

(i) yellow body, white eyed one with its wild type, the percentage of recombination is less.

(ii) white eyed, miniature winged one with its

wild type, the percentage of recombination is high.



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12. Give reason for the above statements. Who studied the phenomenon of linkage in *Drosophila*?

Explain the experiment carried out by Morgan in *Drosophila* to demonstrate linkage. What is the observation made by him in that experiment?



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13. What is codominance? Explain with reference to human blood group.



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14. What is polygenic inheritance? Give an example



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15. Define mendel's law of segregation with the help of a monohybrid cross.



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16. What is incomplete dominance? Explain with examples.



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17. Write a short account of chromosomal theory of inheritance.



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18. Write a short note on multiple alleles.



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19. Write a short note on sex linkage.



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20. Inheritance pattern of ABO blood groups in humans shows dominance, codominance and multiple allelism. Explain each concept with the help of blood group genotypes.



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21. Explain sex determination in birds.



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Topic 1 Mendel S Laws Of Inheritance Long Answer Type Questions

1. State the law of independent assortment.



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2. With reference to flower colour in snapdragon, explain incomplete dominance.



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3. Discuss the contribution of Sutton and Boveri by. Making a comparison between the behaviour of chromosomes and genes during meiosis, to explain Mendel's Laws.



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4. Explain Mendel's experiment that describes the inheritance of one gene.



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5. Write the schematic representation of dihybrid cross and mention the result.



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6. State Mendel's law of segregation. Explain it with a suitable example.



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7. . Explain the Law of Dominance using a monohybrid cross.



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8. When a cross is made between a tall plant with yellow seeds (TYy) and another fall plant with green seeds (Ttyy). what proportions of phenotype in the offspring could be expected to be (a) tall and green (b) dwarf and green..



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9. (a) Mention the features of Law of Dominance observed by Mendel.

(b) Mention the possible genotypes of human A, B, AB and O blood groups.



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10. Explain Mendel's dihybrid cross.



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11. Describe the mechanism of inheritance of the ABO system of blood groups, highlighting the principle of genetics involved in it.



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12. Briefly describe the chromosomal basis of inheritance.



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13. Inheritance pattern of flower color in garden pea plant and snapdragon differs. Why is this difference observed? Explain showing the crosses up to F_1 generation.



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14. During its studies on genes in drosophila that were sex linked, T.H. Morgan found F_2 population phenotypic ratio derived from

expected 9:3:3:1. Explain. The conclusion be arrived at.



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Topic 2 Sex Determination And Genetic Disorders Very Short Answer Type Questions

1. Which genetic disease is characterized by the reduced synthesis of mutant hemoglobin ?



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Topic 2 Sex Determination And Genetic Disorders

Very Short Answer Type Questions

1. Klinefelters syndrome is not seen in human females - give reason.



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2. Hypertrichosis of the ear is regarded as a male character. Why?



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3. Write the chromosomal complement of Klinefelter's syndrome.



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4. Give reason - Haemophilia is called 'Bleeder's disease.



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5. Define point mutation. Give an example for point mutation.



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6. Why the frequency of red-green colour blindness is many times higher in males than that in the females?



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7. How are alleles of particular gene different?

Explain its significance.



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8. Give the reason for Down's syndrome.



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9. Which one change in the cause of sickle-cell anaemia?



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10. What is aneuploidy?



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11. Who first observed the X-chromosome?

What was it called then?



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12. What do the symbols square and circle in a pedigree chart indicate ?



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13. Why is *Drosophila* male fly referred to as heterogametic?



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14. What is a mutagens? Give one example.



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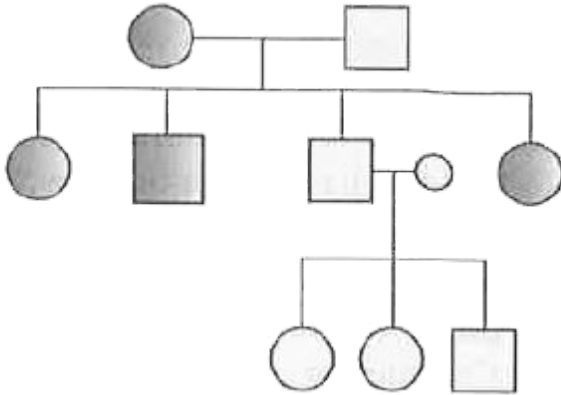
15. What is meant by chromosomal mutations?



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16. In the following pedigree chart, state if the trait is autosomal dominant, autosomal recessive or sex linked . Give a reason for your

answer.



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**Topic 2 Sex Determination And Genetic Disorders
Short Answer Type Questions I**

1. What is the karyotype in Turner's syndrome ?

Mention two symptoms of the syndrome .



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2. What is sex linked inheritance? Give an example.



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3. What is Y linked inheritance? Give an example.



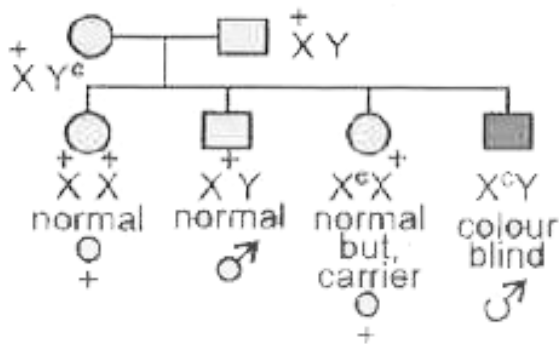
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4. *Drosophila melanogaster* is a model organism in genetic studies. Justify?



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5. A normal visioned woman, whose father is colour blind, marries a normal visioned man. What would be the probability of her (a) sons (b) daughters to be colour blind? Explain with the help of pedigree chart.



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6. If a father and son are both defective in red-green color vision, is it likely that the son inherited the trait from his father? Comment.



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7. How is a child affected if it has grown from the zygote formed by an XX-egg fertilised by a Y-carrying sperm? What do you call this abnormality?



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8. Sex determination is based on particular chromosomes in both birds and humans. State two point of difference between their mechanisms of sex determination.



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9. What is the cause of Phenylketonuria. Explain the disorder.



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10. Differentiate: autosomes and allosomes.



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11. The human male never passes on the gene for haemophilia to his son. Why?



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12. Name the animal in which sex is determined by number of chromosomes. Who

produced the first induced mutation?



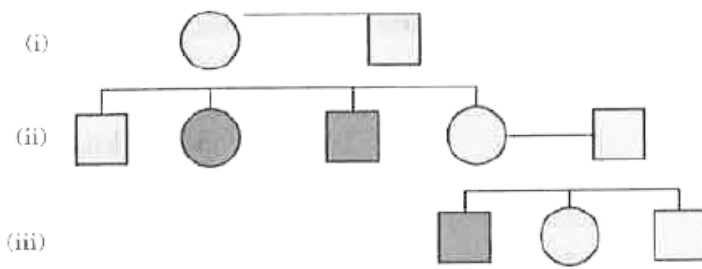
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13. What is the basis of Down's syndrome disorder?



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14. Study the given pedigree chart and answer the questions that follow.



Is the trait recessive or dominant?

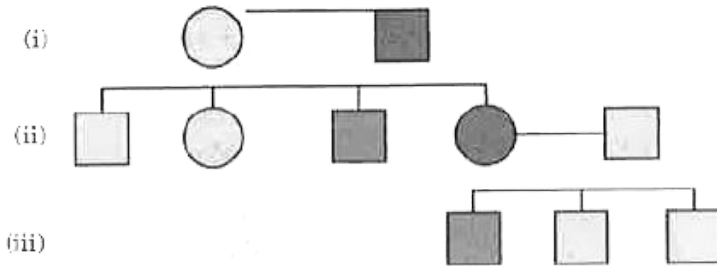
Is the trait sex linked or autosomal?

Give the genotypes of the parents in generation I and their third and fourth child in generation II.



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15. Study the given pedigree chart and answer the questions that follow.



Is the trait recessive or dominant?

Is the trait sex linked or autosomal?

Give the genotypes of the parents shown in generation I and their III child shown in generation II and the first grandchild shown in generation III.



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16. Explain the pattern of inheritance of haemophilia in humans. Why is the possibility of a human female becoming a haemophilic is extremely rare? Explain.



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17. 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?



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18. Give the chromosomal constitution and the resulting sex in each of the following syndrome.

(a) Turner's syndrome (b) Klinefelter's syndrome



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19. Write any four abnormalities of Down syndrome.



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Topic 2 Sex Determination And Genetic Disorders Short Answer Type Questions Ii

1. Mention the causes and effects of phenylketonuria.



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2. (a) In humans, males are heterogametic and females are homogametic, Explain. Are there any examples where males are homogametic and females are heterogametic ? (b) Also describe as to, who determines the sex of an unborn child ? Mention whether temperature has a role in sex determination.



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3. Explain the mechanism of sex determination in insects like *Drosophila* and grasshopper.



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4. Briefly explain sickle cell anaemia.



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5. What are the various causes of human genetic disorders?



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6. What is haemophilia ? Mention the types.



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Topic 2 Sex Determination And Genetic Disorders

Long Answer Type Questions

1. Define aneuploidy. How is it different from polyploidy ? Describe the individuals having following chromosomal abnormalities.

(a) Trisomy of 21st chromosome

(b) XXX

(c) XO



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2. Distinguish between Mendelian disorder and chromosomal disorder.



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3. Explain the causes, inheritance pattern, symptoms of two Mendelian genetic disorders.



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4. Mention any two autosomal genetic disorders with their symptoms.



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**Topic 2 Sex Determination And Genetic Disorders
Multiple Choice Questions**

1. All genes located on the same chromosome :

A. Form different groups depending upon their relative distance

B. Form one linkage group

C. Will not form any linkage groups

D. Form interactive groups that affect the phenotype

Answer: B



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2. Conditions of a karyotype $2n \pm 1$ and $2n \pm 2$ are called :

A. Aneuploidy

B. Polyploidy

C. Allopolyploidy

D. Monosomy

Answer: A



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3. Distance between the genes and percentage of recombination shows :

- A. A direct relationship.
- B. An inverse relationship.
- C. A parallel relationship.
- D. No relationship.

Answer: A



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4. If a genetic disease is transferred from a phenotypically normal but carrier female to only some of the male progeny, the disease is :

A. Autosomal dominant.

B. Autosomal recessive.

C. Sex-linked dominant.

D. Sex-linked recessive.

Answer: D



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5. In sickle cell anaemia glutamic acid is replaced by valine. Which one of the following triplets codes for valine?

A. G G G

B. A A G

C. G A A

D. G U G

Answer: D



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6. Person having genotype $I^A I^B$ would show the blood group as AB. This is because of:

A. Pleiotropy.

B. Co-dominance.

C. Segregation.

D. Incomplete dominance.

Answer: B



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7. ZZ/ZW type of sex determination is seen in :

A. Platypus

B. Snails

C. Cockroach

D. Peacock

Answer: D



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8. A cross between two tall plants resulted in offspring having few dwarf plants. What would be the genotypes of both the parents?

A. TT and Tt

B. Tt and Tt

C. TT and TT

D. Tt and tt

Answer: B



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9. In a dihybrid cross, if you get 9:3:3:1 ratio it denotes that:

- A. The alleles of two genes are interacting with each other.
- B. It is a multigenic inheritance
- C. It is a case of multiple allelism
- D. The alleles of two genes are segregating independently.

Answer: D



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10. Which of the following will not result in variations among siblings?

A. Independent assortment of genes.

B. Crossing over

C. Linkage.

D. Mutation.

Answer: C



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11. Mendel's Law of independent assortment holds good for genes situated on the :

- A. Non-homologous chromosomes.
- B. Homologous chromosomes.
- C. Extra nuclear genetic element.
- D. Same chromosome.

Answer: A



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12. Occasionally, a single gene may express more than one effect. The phenomenon is called :

A. Multiple allelism

B. Mosaicism

C. Pleiotropy

D. Polygeny

Answer: C



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13. In a certain taxon of insects some have 17 chromosomes and the others have 18 chromosomes. The 17 and 18 chromosome-bearing organisms are:

A. Males and females, respectively.

B. Females and males, respectively.

C. All males.

D. All females.

Answer: A



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14. The inheritance pattern of a gene over generations among humans is studied by the pedigree analysis. Character studied in the pedigree analysis is equivalent to :

A. Quantitative trait

B. Mendelian trait

C. Polygenic trait

D. Maternal trait

Answer: B



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15. It is said that Mendel proposed that the factor controlling any character is discrete and independent. This proposition was based on the :

A. Results of F_3 generation of a cross.

B. Observations that the offspring of a cross made between the plants having

two contrasting characters shows only one character without any blending

C. Self pollination of F_1 offsprings.

D. Cross pollination of parental generations.

Answer: B



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16. Two genes 'A' and 'B' are linked. In a dihybrid cross involving these two genes, the F_1 heterozygote is crossed with homozygous recessive parental type (aa bb). What would be the ratio of offspring in the next generation ?

A. 1:1:1:1

B. 9:3:3:1

C. 3:1

D. 1:1

Answer: D



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17. In the F_2 generation of a Mendelian dihybrid cross the number of phenotypes and genotypes are :

- A. Phenotypes - 4, genotypes - 16.
- B. Phenotypes - 9, genotypes - 4.
- C. Phenotypes - 4, genotypes - 8.
- D. Phenotypes - 4, genotypes - 9.

Answer: D



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18. Mother and father of a person with 'O' blood group have 'A' and 'B' blood group respectively. What would be the genotype of both mother and father?

A. Mother is homozygous for 'A' blood group and father is heterozygous for 'B'.

B. Mother is heterozygous for 'A' blood group and father is homozygous for 'B'.

C. Both mother and father are heterozygous for 'A and 'B' blood group, respectively.

D. Both mother and father are homozygous for 'A and 'B' blood group, respectively.

Answer: C



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