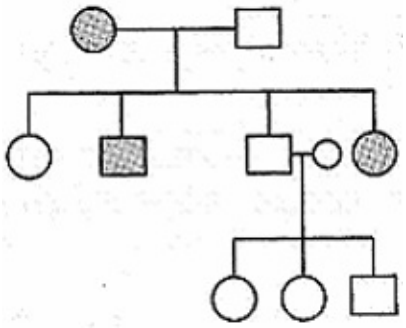
CBSE Test Paper 05

Ch-5 Principles of Inheritance and Variation

1. In humans, height shows a lot of variation. It is an example of
   a. Polygenic inheritance
   b. False allelic inheritance
   c. Pleiotrophic inheritance
   d. Multiple alleles
2. The best method to determine the homozygous and heterozygous of an individual is
   a. Back cross
   b. Self-fertilization
   c. Inbreeding
   d. Test cross
3. A person with unknown blood group under ABO system has suffered much blood loss in an accident and needs immediate blood transfusion. His one friend, who has a valid certificate of his own blood type, offers for blood donation without delay. What would have been the type of blood group of the donor friend?
   a. Type B
   b. Type A
   c. Type O
   d. Type AB
4. In T. H. Morgan"s Experiment on Drosophilia what will be the result when F1 female flies are crossed with double recessive male files?
   a. 41.5 % parental combination, 58.5% recombination
   b. 83% parental combination, 17% recombination
   c. 60% parental combination, 40 % recombination
   d. 90 % parental combination, 10% recombination
5. The test cross is used to determine the
   a. Ferrotype of plant
   b. Denotype of the plant
   c. Genotype of the plant
   d. Phenotype of the plant

6. Give the phenotypic ratio of a dihybrid cross in garden pea.
7. Who first observed the X-chromosome? What was it called then?
8. Who had proposed the chromosomal theory of inheritance?
9. Write the scientific name of the organism that Morgan used for his linkage experiment.
10. Sex determination is based on particular chromosomes in both birds and humans. State two points of difference between their mechanisms of sex determination.
11. In the following pedigree chart, state if the trait is autosomal dominant, autosomal recessive or sex-linked. Give reason.



12. What is a mutagen? Give one example.
13. A child has blood group O. If the father has blood group B, work out the genotypes of the parents and the possible genotypes of the other offsprings.
14. What is pedigree analysis? Suggest how such an analysis can be useful?
15. a. You are given tall pea plants with yellow seeds whose genotypes are unknown. How would you find the genotype of these plants? Explain with the help of cross.
    b. Identify a, b and c in the table given below:

	Pattern of Inheritance	**Monohybrid F_1 Phenotypic expression**
1	Co-dominance	a
2	b	The progeny resembled only one of the parents
3	Incomplete dominance	c

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Answer

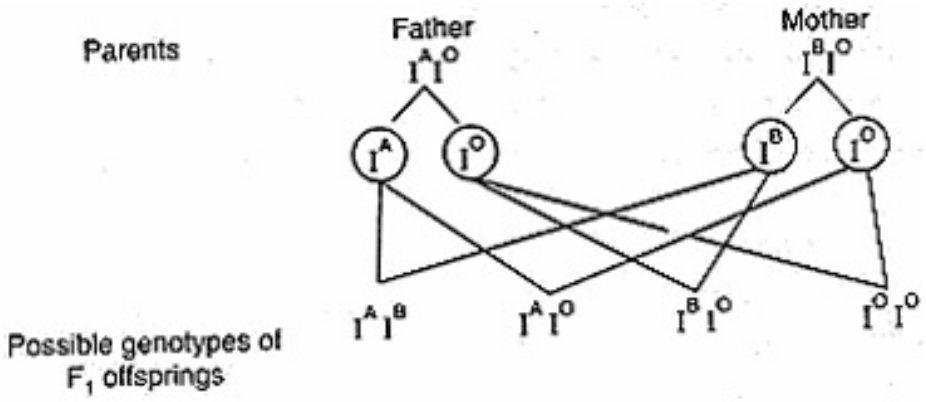
1. a. Polygenic inheritance, **Explanation:** Height of human being is not controlled by single pair of gene. A number of genes participate to form growth hormone that actually triggers the height of individual.
2. d. Test cross, **Explanation:** Homozygous and heterozygous of an individual is determined by test cross method in which homozygous recessive is crossed with F1 hybrid individual.
3. c. Type O, **Explanation:** A person with unknown blood group under ABO grouping should be given Type O blood group as O is universal donor and can be transfused to any person.
4. b. 83% parental combination, 17% recombination, **Explanation:** When F1 female flies (Drosophila) obtained in crossed with double recessive male flies 83% parental combination are obtained along with 17% recombinant offspring are formed.
5. c. Genotype of the plant, **Explanation:** The test cross is used to determine the genotype of the plant in which F1 plant is crossed with homozygous recessive plants. If the ratio is 1:1 the plant is homozygous.
6. The phenotypic ratio of a dihybrid cross in garden pea is 9 : 3 : 3 : 1.
7. Henking first observed the X-chromosome and he called it as X body.
8. Sutton and Boveri.
9. Drosophila melanogaster.
10. Birds
    (i) Female: Autosomes +ZW
    Male: Autosomes + ZZ
    (ii) Male homogametic, female heterogametic
    Human beings

Autosomes + XX
Autosomes + X
Female homogametic
Male heerogametic

11. Autosomal dominant.
    The defective trait is present in both male and female progeny and the unaffected child did not pass the trait.

12. A mutagen is a physical or chemical agent that changes the genetic material, usually DNA, of an organism and thus increases the frequency of mutations above the natural background level. Example: X-rays.

13. The parents of the child will be heterozygous for their blood groups. Therefore, his father with blood group A must have genotype (I^AI^O) and mother with blood group B must have genotype (I^BI^O)



14. A record of inheritance of certain genetic traits for two or more generations presented in the form of a diagram or family tree is called pedigree. Analysis of traits in a several generation of a family is called as pedigree analysis. It is employed in case of human beings and domesticated animals.
    Importance:
    (i) In human genetics, pedigree study provides a strong tool which is utilised to trace the inheritance of a specific trait, abnormality or disease.
    (ii) It is useful for the genetic counsellors to advice in tending couples about the possibility of having children with genetic defects like haemophilia, colour blindness, alkaptonuria, thalassemia and sickle all anaemic.

15. (a) The given plant has to be crossed with a dwarf plant with green seeds. Tallness and yellow seeds are dominant traits whereas dwarfness and green seeds are recessive traits. If the progeny consists of tall plants with yellow seeds, the given plant is homozygous. (Cross 1) If the progeny shows four phenotypes in the ratio of 1 : 1 : 1 : 1 , the given plant is heterozygous for both the traits. (Cross 2) Cross 1 : Homozygous pure for both the traits.