

# **BIOLOGY**

**NEET**

**CRASH COURSE**

**PRINCIPLES OF INHERITANCE  
AND VARIATION**

**SMART ACHIEVERS**  
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**PRINCIPLES OF INHERITANCE AND VARIATION**

1. Genetics is a branch of biology which deals with principles of inheritance and variation.
2. Mendelian Inheritance (Mendelism)
  - (i) Mendel proposed that something was being stably passed down, unchanged, from parent to offspring through the gametes, over successive generations. He called these things as 'factors'.
  - (ii) The dominant characters are expressed when factors are in heterozygous condition (Law of Dominance).
  - (iii) The characters never blend in heterozygous condition.
  - (iv) The recessive characters are only expressed in homozygous condition.
  - (v) A recessive trait that was not expressed in heterozygous condition may express again when it become homozygous. Hence, characters segregate while formation of gametes (Law of Segregation).
  - (vi) Mendel also studied the inheritance of two characters together and he found that the factors independently assort and combine in all permutations and combinations (Law of Independent Assortment).
3. The factors on chromosomes regulating the characters are called the genotype and the physical expression of the characters is called phenotype.
4. Walter Sutton and Theodore Boveri noted that the behaviour of chromosomes was parallel to the behaviour of genes and used chromosome movement to explain Mendel's laws.
5. Mendel's law of independent assortment is not true for the genes that were located on the same chromosomes (i.e., linked genes).
6. Closely located genes assorted together, and distantly located genes, due to recombination, assorted independently.
7. Frequency of recombination between gene pairs on the same chromosome is a measure of the distance between genes.
8. Mutation is defined as change in the genetic material. A point mutation is a change of a single base pair in DNA. Some mutations involve changes in whole set of chromosomes (polyploidy) or change in a subset of chromosome number (aneuploidy).
9. Sickle-cell anaemia is caused due to change of one base in the gene coding for  $\beta$ -chain of haemoglobin.
10. Inheritable mutations can be studied by generating a pedigree of a family.
11. Down's syndrome is due to trisomy of chromosome 21. In Turner's syndrome, one X-chromosome is missing and the sex chromosome is as XO.
12. In Klinefelter's syndrome, the condition is XXY.

**EXERCISE**

- Q.1 Mendel formulated the law of purity of gametes on the basis of:  
 (1) Dihybrid cross (2) Monohybrid cross (3) Back cross (4) Test cross
- Q.2 Mendelian monohybrid ratio is :  
 (1) 1 : 2 : 1 (2) 3 : 1 (3) 9 : 3 : 1 (4) 9 : 3 : 4
- Q.3 In a monohybrid cross the genotypic ratio of the offspring in  $F_2$  generation is :  
 (1) 3 : 1 (2) 1 : 2 : 1 (3) 1 : 1 : 1 : 1 (4) 4 : 0
- Q.4 A cross between  $AaBB \times aaBB$  yields a genotypic ratio of :  
 (1) 1  $AaBB$  : 1  $aaBB$  (2) 1  $AaBB$  : 3  $aaBB$  (3) 3  $AaBB$  : 1  $aaBB$  (4) All  $AaBb$
- Q.5 Back cross is a cross between :  
 (1)  $F_1 \times F_1$  (2)  $F_1 \times$  Recessive (3)  $F_1 \times$  Dominant (4)  $F_1 \times$  any parent
- Q.6 What is the ratio of a progeny of cross between  $F_1$  heterozygous and recessive :  
 (1) 3 : 1 (2) 1 : 2 : 1 (3) 1 : 1 (4) 2 : 1
- Q.7 Which genotype represents a true dihybrid condition  
 (1)  $tt\ rr$  (2)  $Tt\ rr$  (3)  $Tt\ Rr$  (4)  $TT\ Rr$
- Q.8 Mendelian ratio 9 : 3 : 3 : 1 is due to :  
 (1) Law of segregation (2) Law of purity of gametes  
 (3) Law of independent assortment (4) Law of unit characters
- Q.9 A dihybrid ratio is :  
 (1) 1 : 1 : 1 : 1 (2) 3 : 1 (3) 9 : 3 : 3 : 1 (4) 9 : 5 : 1 : 1
- Q.10 Who rediscovered the results of Mendel's experiments :  
 (1) DeVries, Tschemark, Correns (2) DeVries, Tschemark, Morgan  
 (3) Tschemark, Morgan, Correns (4) Tschemark, Bateson, Punnett,
- Q.11 If 120 Plants are produced on crossing pure red and pure white flowered pea plants, than the ratio of offsprings will be :-  
 (1) 90 Red : 30 White (2) 30 Red : 90 White (3) 60 Red : 60 White (4) All Red
- Q.12 Pea plants were more suitable than cattle for Mendel's experiment because :  
 (1) There were no breeding records of cattles  
 (2) Pea plants can be self-fertilised  
 (3) Cattle are not easy to maintain  
 (4) All pea plants have  $2n$  chromosomes and fewer genetic traits
- Q.13 Two allelic genes are located on :  
 (1) The same chromosome (2) Two homologous chromosomes  
 (3) Two-non-homologous chromosomes (4) Any two chromosomes

- Q.14 Different forms of a gene are called :  
 (1) Heterozygotes (2) Alleles (3) Character (4) Traits
- Q.15 How many character of pea pod were chosen by Mendel ?  
 (1) 7 (2) 2 (3) 4 (4) 3
- Q.16 When two hybrids Ttrr & Rrtt are crossed, the phenotypic ratio of offspring shall be :  
 (1) 3 : 1 (2) 1 : 1 : 1 : 1 (3) 1 : 1 (4) 9 : 3 : 3 : 1
- Q.17 The allele which is unable to express its effect in the presence of another is called :  
 (1) Co-dominant (2) Supplementary (3) Complementary (4) Recessive
- Q.18 Mendelism is genetics of:  
 (1) Haploids (2) Diploids (3) Prokaryotes (4) All the above
- Q.19 How many plants are dihybrid in F<sub>2</sub> generation of dihybrid cross :  
 (1) One (2) Two (3) Four (4) Sixteen
- Q.20 What is the ratio of one pair of contrasting characters in F<sub>2</sub> of a dihybrid cross :-  
 (1) 5 : 3 (2) 3 : 1 (3) 9 : 3 : 3 : 1 (4) 1 : 2 : 2 : 4 : 1 : 2 : 1 : 2 : 1
- Q.21 Which of the following is significance of dominance  
 (1) Organisms with dominant genes are more vital  
 (2) Harmful mutations are not expressed due to dominant gene  
 (3) Heterosis is due to dominant gene  
 (4) All the above
- Q.22 An offspring of two homozygous parents differing from one another by alleles at only one gene locus is known as :  
 (1) Back cross (2) Monohybrid (3) Dihybrid (4) Trihybrid
- Q.23 A useful process for determining whether an individual is homozygous or heterozygous is :  
 (1) Cross-breeding (2) Self fertilization (3) Back - crossing (4) Test cross
- Q.24 A pure tall plant can be differentiated from a hybrid tall plant :  
 (1) By measuring length of plant (2) By spraying gibberalins  
 (3) If all plants are tall after self-pollination (4) If all plants are dwarf after self-pollination
- Q.25 Allele is the :  
 (1) Alternative form of gene pair  
 (2) Total number of genes for a trait  
 (3) Total number of chromosomes of a haploid set  
 (4) Total number of genes present on a chromosome
- Q.26 A character which is expressed in a hybrid is called  
 (1) Dominant (2) Recessive (3) Co-dominant (4) Epistatic

- Q.27 Genetic constitution of an individual is represented by :  
(1) Genome (2) Genotype (3) Phenotype (4) Karyotype
- Q.28 The genes for same trait present on non-homologous chromosomes are :-  
(1) Alleles (2) Linked genes (3) Multiple alleles (4) None of these
- Q.29 How many types of gametes are expected from the organism with genotype AABBCc :-  
(1) One (2) Two (3) Four (4) Eight
- Q.30 The plant which made Hugo -de vries famous is :-  
(1) Antirrhinum majas (2) Lathyrus odoratus  
(3) Oenothera lamarckiana (4) Pisum sativum
- Q.31 Due to the cross between TTRr  $\times$  ttrr the resultant progenies showed how many percent plants would be, tall, red flowered :  
(1) 50% (2) 75% (3) 25% (4) 100%
- Q.32 Which one of the following traits of garden pea studied by Mendel, was a recessive feature:-  
(1) Axial flower position (2) Green seed colour  
(3) Green pod colour (4) Round seed shape
- Q.33 When a red flower homozygous pea plant is crossed with a white flower plant what colour is produced in F<sub>1</sub> :  
(1) Red (2) White (3) Pink (4) Red + white
- Q.34 Two crosses between the same pair of genotypes or phenotypes in which the sources of the gametes are reversed in one cross, is known as :  
(1) Test cross (2) Reciprocal cross (3) Dihybrid cross (4) Reverse cross
- Q.35 The process of mating between closely related individuals is :  
(1) Out-breeding (2) Inbreeding (3) Hybridisation (4) Heterosis
- Q.36 Marriages between close relatives should be avoided because it includes more  
(1) Recessive alleles to come together (2) Mutations  
(3) Multiple births (4) Blood group abnormalities
- Q.37 Phenotype of an organism is the result of –  
(1) Mutations and linkages  
(2) Cytoplasmic effects and nutrition  
(3) Environmental changes and sexual dimorphism  
(4) Genotype and environment interactions
- Q.38 Test cross involves  
(1) Crossing between two genotypes with recessive trait  
(2) Crossing between two F<sub>1</sub> hybrids  
(3) Crossing the F<sub>1</sub> hybrid with a double recessive genotype  
(4) Crossing between two genotypes with dominant trait

- Q.39 Segregation of genes take place during :  
 (1) Metaphase (2) Anaphase (3) Prophase (4) Embryo formation
- Q.40 Which one of the following cannot be explained on the basis of Mendel's Law of Dominance?  
 (1) Alleles do not show any blending and both the characters recover as such in  $F_2$  generation.  
 (2) Factors occur in pairs.  
 (3) The discrete unit controlling a particular character is called a factor.  
 (4) Out of one pair of factors one is dominant and the other recessive.
- Q.41 A test cross is performed :  
 (1) by selfing of  $F_2$ -generation plants  
 (2) by selfing of  $F_1$ -generation plants  
 (3) to determine whether  $F_1$ -plant is homozygous or heterozygous  
 (4) between a homozygous dominant and homozygous recessive plant
- Q.42 Which genotype represents a true hybrid condition :  
 (1)  $TTrr$  (2)  $TtRr$  (3)  $TTRr$  (4)  $ttrr$
- Q.43 Mendel choose pea plant due to :-  
 (1) its economic importance (2) presence of contrasting characters  
 (3) its availability (4) its cheapness
- Q.44 Mendel's laws of inheritance are applicable on the plants which :  
 (1) Reproduce asexually (2) Reproduce sexually  
 (3) Reproduce vegetatively (4) All of the above plants
- Q.45 When two unrelated individuals or lines are crossed, the performance of  $F_1$  hybrid is often superior to both its parents. This phenomenon is called :-  
 (1) Heterosis (2) Transformation (3) Splicing (4) Metamorphosis
- Q.46 Emasculation is related to :  
 (1) Pure line (2) Mass selection (3) Clonal selection (4) Hybridisation
- Q.47 Two allelic genes are located on :  
 (1) the same chromosome (2) two homologous chromosome  
 (3) two non-homologous chromosome (4) any two chromosomes
- Q.48 The colour based contrasting traits in seven contrasting pairs studied by Mendel in pea were  
 (1) 1 (2) 2 (3) 3 (4) 4
- Q.49 In *Mirabilis* & *Antirrhinum* plant the appearance of the pink hybrid ( $Rr$ ) between cross of a red ( $RR$ ) and white ( $rr$ ) flower parent indicates :  
 (1) Incomplete dominance (2) Segregation  
 (3) Dominance (4) Heterosis
- Q.50 In case of incomplete dominance the monohybrid ratio of phenotypes in  $F_2$  generation is :  
 (1) 1 : 2 : 1 (2) 3 : 1 : 1 (3) 9 : 3 : 3 : 1 (4) 2 : 3 : 1

- Q.51 Cytoplasmic male sterility is inherited :  
(1) Maternally (2) Paternally  
(3) Both (4) Bacteriophage multiplication
- Q.52 In which type of inheritance the results are affected by reciprocal cross :  
(1) Nuclear (2) Cytoplasmic (3) Blending (4) All the above
- Q.53 Which of the following is exception to Mendel's laws  
(1) Linkage (2) Incomplete dominance  
(3) Co-dominance (4) All of the above
- Q.54 The phenomenon of incomplete dominance was observed by :  
(1) De vries (2) Correns (3) Tschermak (4) None
- Q.55 Mendel did not propose :  
(1) Dominance (2) Incomplete dominance  
(3) Segregation (4) Independent assortment
- Q.56 Albinism in corn is due to :  
(1) Pathogenic effect (2) Deficiency of light  
(3) Deficiency of minerals (4) lethal gene effect
- Q.57 The phenomenon in which an allele of one gene suppresses the expression of an allele of another gene is known as :  
(1) Dominance (2) Inactivation (3) Epistasis (4) Suppression
- Q.58 Polygenic genes show :  
(1) Identical phenotype (2) Identical biochemistry  
(3) Different phenotype (4) Identical genotype
- Q.59 A child is blood group is 'O'. His parents blood group can not be :  
(1) B & O (2) A & O (3) AB (4) A & B
- Q.60 Epistatic gene differs from dominant gene in :  
(1) Epistatic gene is non-allelic  
(2) Epistatic gene never express itself independently  
(3) Epistatic and hypostatic genes are present at different loci  
(4) All the above
- Q.61 An example of the quantitative trait in man is :  
(1) Hair colour (2) Colour of eye (3) Skin colour (4) Shape of nose
- Q.62 Blood grouping in humans is controlled by :  
(1) 4 alleles in which  $I^A$  is dominant (2) 3 alleles in which  $I^A$  and  $I^B$  are dominant  
(3) 2 alleles in which none is dominant (4) 3 alleles in which  $I^A$  is recessive

- Q.63 Multiple alleles are present :  
 (1) In different chromosomes  
 (2) At different loci on chromosome  
 (3) At the same locus on homologous chromosomes  
 (4) At the non homologous chromosome
- Q.64 Which of the following is the example of pleiotropic gene :  
 (1) Haemophilia (2) Thalassemia (3) Sickle cell anaemia (4) Colour blindness
- Q.65 In a genetic cross having recessive epistasis,  $F_2$  phenotypic ratio would be :  
 (1) 9 : 6 : 1 (2) 15 : 1 (3) 9 : 3 : 4 (4) 12 : 3 : 1
- Q.66 Sickle cell anaemia induces due to :  
 (1) Change of Amino Acid in  $\alpha$  – chain of Haemoglobin  
 (2) Change of Amino Acid in  $\beta$  – chain of Haemoglobin  
 (3) Change of Amino Acid in both  $\alpha$  and  $\beta$  chain of Haemoglobin  
 (4) Change of Amino acid either  $\alpha$  or  $\beta$  chain of Haemoglobin
- Q.67 Inheritance of skin colour in humans is an example of :  
 (1) chromosomal aberration (2) point mutation  
 (3) polygenic inheritance (4) codominance
- Q.68 Incomplete dominance is found in :-  
 (1) *Pisum sativum*  
 (2) *Antirrhinum majus*  
 (3) Both *Pisum sativum* and *Antirrhinum majus*  
 (4) None of these
- Q.69 Epistasis implies :  
 (1) One pair of genes can completely mask the expression of another pair of genes  
 (2) One pair of genes independently controls a particular phenotype  
 (3) One pair of genes enhances the phenotypic expression of another pair of genes  
 (4) Many genes collectively control a particular phenotype
- Q.70 A child with mother of blood group A and father of blood group AB, will not have which of the following blood group :  
 (1) A (2) B (3) AB (4) O
- Q.71 A polygenic inheritance in human beings is  
 (1) skin colour (2) sickle cell anaemia (3) colour blindness (4) phenylketonuria
- Q.72 Gene for cytoplasmic male sterility in plants are generally located in the :  
 (1) chloroplast genome (2) mitochondrial genome  
 (3) nuclear genome (4) cytosol
- Q.73 When both alleles of a pair are fully expressed in a heterozygote, they are called :  
 (1) Lethals (2) Co-dominants (3) Semi-dominants (4) Recessive allele

- Q.74 Which of the four couples claiming the baby with O<sup>+</sup> blood type are possibly the biological parents of it?  
 (1) AB<sup>-</sup> and A<sup>+</sup>                      (2) A<sup>+</sup> and O<sup>-</sup>                      (3) O<sup>+</sup> and AB<sup>+</sup>                      (4) B<sup>-</sup> and O<sup>-</sup>
- Q.75 A colourblind man marries a normal lady whose father was colour blind. If it produces two sons & two daughters, how many of them would be suffer  
 (1) Both sons    (2) Both daughters  
 (3) One son & one daughter                      (4) Both sons & both daughters
- Q.76 Hypertrichosis is :  
 (1) Holandric character    (2) X-Linked character  
 (3) Diagenic character    (4) Sex-influenced character
- Q.77 The condition in which only one allele of a pair is present in a diploid organism is known as :  
 (1) Homozygous                      (2) Heterozygous                      (3) Hemizygous                      (4) Incomplete dominance
- Q.78 Colourblindness is a :  
 (1) Sex limited character    (2) Sex linked character  
 (3) Sex influenced character    (4) None
- Q.79 Baldness in man is a :  
 (1) Autosomal character    (2) Sex linked character  
 (3) Sex influenced character    (4) 1 and 3 both
- Q.80 A colourblind man marries a daughter of colourblind father, then in the offsprings :  
 (1) All sons are colourblind    (2) All daughters are colourblind  
 (3) Half sons are colourblind    (4) No daughter is colourblind
- Q.81 Sex- linked disorders are generally :  
 (1) Lethal                      (2) Recessive                      (3) Dominant                      (4) Not inherited
- Q.82 Male XX and female XY sometime occur due to :  
 (1) Deletion    (2) Transfer of segments in X and Y chromosomes  
 (3) Anneuploidy    (4) Hormonal imbalance
- Q.83 The linkage map of X-chromosome of fruitfly has 66 units, with yellow body gene (y) at one end and bobbed hair (b) gene at the other end. The recombination frequency between these two genes (y and b) should be :  
 (1) 60%                      (2) > 50%                      (3) ≤ 50%                      (4) 100%
- Q.84 When a cluster of genes show linkage behaviour they :  
 (1) Do not show a chromosome map    (2) Show recombination during meiosis  
 (3) Do not show independent assortment    (4) Induce cell division
- Q.85 One of the genes present exclusively on the X-chromosome in humans is concerned with  
 (1) Baldness    (2) Red green colour blindness.  
 (3) Facial hair/Moustaches in males.    (4) Night blindness.

- Q.86 Lack of independent assortment of two genes A and B in fruit fly *Drosophila* is due to :  
(1) Crossing over      (2) Repulsion      (3) Recombination      (4) Linkage
- Q.87 If father shows normal genotype and mother shows a carrier trait for haemophilia  
(1) All the female children will be carrier  
(2) A male child has 50% chances of active disease  
(3) Female child has probability of 50% to active disease  
(4) All the female children will be colourblind
- Q.88 Which statement is incorrect about linkage-  
(1) It helps in maintaining the valuable traits of new varieties  
(2) It helps in forming new recombinants  
(3) Knowledge of linkage helps the breeder to combine all desirable traits in a single variety.  
(4) It helps in locating genes on chromosome
- Q.89 A woman with normal vision, but whose father was colour blind, marries a colour blind man. Suppose that the fourth child of this couple was a boy. This boy  
(1) Must have normal colour vision  
(2) May be colour blind or may be normal vision  
(3) Will be partially colour blind since he is heterozygous for the colour blind mutant allele  
(4) Must be colour blind
- Q.90 Haemophilia is more commonly seen in human males than in human females because  
(1) This disease is due to a Y-linked recessive mutation  
(2) This disease is due to an X-linked recessive mutation  
(3) This disease is due to an X-linked dominant mutation  
(4) A greater proportion of girls die in infancy
- Q.91 Mendel did not include in his laws :  
(1) Segregation      (2) Dominance      (3) Purity of gametes      (4) Linkage
- Q.92 Mendel had a difficulty in explaining the linked characters due to :  
(1) Law of dominance      (2) Law of segregation  
(3) Law of independent assortment      (4) All the above
- Q.93 The first attempt to show linkage in plants was done in  
(1) *Pisum sativum*      (2) *Lathyrus odoratus*      (3) *Zea mays*      (4) *Oenothera lamarckiana*
- Q.94 A dihybrid plant with incomplete linkage on test cross may produce how many types of plants :  
(1) 2      (2) 4      (3) 8      (4) 1
- Q.95 If distance between gene on chromosome is more, then gene shows :  
(1) Weak linkage      (2) Strong linkage      (3) Less crossing      (4) 1 & 3 both
- Q.96 Complete linkage is found in :  
(1) Birds      (2) Snakes      (3) Female-*Drosophila*      (4) Male-*Drosophila*

- Q.97 A phenomenon which works opposite to the linkage is :  
 (1) Independent assortment (2) Crossing-over  
 (3) Segregation (4) Mutation
- Q.98 How the sex of offsprings determined in humans  
 (1) Sex chromosome of mother (2) Size of ovum  
 (3) Size of sperm (4) Sex chromosome of father
- Q.99 In plants sex determination due to :  
 (1) X – chromosome (2) Y – chromosome (3) A – chromosome (4) B – Chromosome
- Q.100 Which chromosome set is found in male grass hopper :  
 (1)  $2A + XY$  (2)  $2A + XO$  (3)  $2A + YY$  (4)  $2A + XX$
- Q.101 In Neurospora all alleles express their effect because :  
 (1) Each gene has many alleles (2) Many genes has only one allele  
 (3) It has only one allele of a gene (4) There are two alleles of a gene
- Q.102 No. of Bar Body in XXXX female :  
 (1) 1 (2) 2 (3) 3 (4) 4
- Q.103 In Drosophila, the sex is determined by :  
 (1) The ratio of number of X–chromosomes to the sets of autosomes  
 (2) X and Y chromosomes  
 (3) The ratio of pairs of X-chromosomes to the pairs of autosomes  
 (4) Whether the egg is fertilized or develops parthenogenetically
- Q.104 A diseased man marries a normal woman. They get three daughters and five sons. All the daughters were diseased and sons were normal. The gene of this disease is :  
 (1) Sex linked dominant (2) Sex linked recessive  
 (3) Sex limited character (4) Autosomal dominant
- Q.105 *Drosophila melanogaster* has :  
 (1) 2 pairs of autosomes and 1 pair of sex chromosomes  
 (2) 3 pairs of autosomes and 3 pairs of sex chromosomes  
 (3) 1 pairs of autosomes and 3 pairs of sex chromosomes  
 (4) 3 pairs of autosomes and 1 pairs of sex chromosomes
- Q.106 Which one of the following is associated with sex-linked inheritance :  
 (1) Night-blindness (2) muscular dystrophy (3) astigmatism (4) Polydactyly
- Q.107 Barr body is associated with :  
 (1) sex chromosome of female (2) sex chromosome of male  
 (3) autosome of female (4) autosome of male
- Q.108 Genetic recombination is due to :  
 (1) fertilization and meiosis (2) mitosis and meiosis  
 (3) fertilization and mitosis (4) fertilization and amitosis

- Q.109 Haemophilic female marries normal male, the theoretical ratio of their offsprings regarding haemophilia will be :
- (1) All offsprings are haemophilic (2) All girls are haemophilic  
(3) All sons are haemophilic (4) half daughters and half sons are haemophilic
- Q.110 Gene for colourblindness is located on :
- (1) Y chromosome (2) 13th chromosome (3) X chromosome (4) 21th chromosome
- Q.111 Linkage was first studied by :
- (1) Darwin (2) Morgan  
(3) Bateson and Punnett (4) Mendel
- Q.112 If a colourblind woman marries with a normal man. The offspring will be :
- (1) All colourblind  
(2) All daughters normal and all son will be colourblind  
(3) All normal  
(4) All daughters will be colourblind and all sons will be normal
- Q.113 If a colourblind man is married to a normal woman, then from the point of view of disease, their offsprings will be :
- (1) All sons will be colourblind (2) All daughters will be colourblind  
(3) all sons and daughters will be normal (4) All sons and daughters will be colour blind
- Q.114 In *Drosophila* sex index of super female is :-
- (1) 1 (2) 0.5 (3) 1.5 (4) 0.67
- Q.115 Which one of the following conditions correctly describes the manner of determining the sex in the given example ?
- (1) Homozygous sex chromosomes (ZZ) determine female sex in Birds.  
(2) XO type of sex chromosomes determine male sex in grasshopper  
(3) XO condition in humans as found in Turner Syndrome, determines female sex.  
(4) Homozygous sex chromosomes (XX) produce male in *Drosophila*
- Q.116 Walter Sutton is famous for his contribution to :
- (1) Genetic engineering (2) Totipotency  
(3) Quantitative genetics (4) Chromosomal theory of inheritance
- Q.117 Frequency of crossing over will be relatively more if :
- (1) distance between the two genes is less (2) distance between the two genes is more  
(3) linked genes are more (4) both (2) & (3)
- Q.118 Crossing over takes place in :
- (1) mitotic cells (2) meiotic cells (3) mutating cells (4) amitotic cells
- Q.119 If a normal woman marries an albino man and their offsprings are half albino, half normal the woman is :
- (1) Homozygous normal (2) Heterozygous normal  
(3) Homozygous recessive (4) Homozygous dominant

Q.120 Parents are carrier for albinism. What will be the first three children :

- (1) Some normal, heterozygous & albino (2) All normal  
 (3) All heterozygous albino (4) No normal

Q.121 Any changes in gene frequency in a population is called :

- (1) Gene flow (2) Genetic drift (3) Gene pool (4) Gene conservation

Q.122 Probability of four son to a couple is :

- (1)  $\frac{1}{4}$  (2)  $\frac{1}{8}$  (3)  $\frac{1}{16}$  (4)  $\frac{1}{32}$

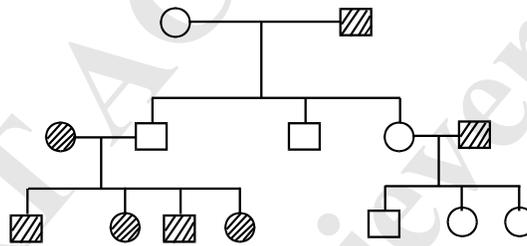
Q.123 Down's syndrome is caused by an extra copy of chromosome number 21. What percentage of offsprings produced by an affected mother and a normal father would be affected by this disorder :

- (1) 50% (2) 25% (3) 100% (4) 75%

Q.124 In the absence of mutation, migration and selection if gene frequencies are changed in a population. This change is due to :

- (1) Polyploidy (2) Hybridization (3) Sampling error (4) Crossing over

Q.125 Study the given pedigree carefully, the trait indicated is :-

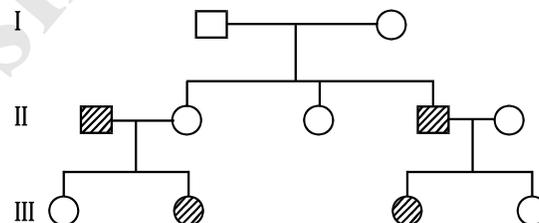


- (1) Autosomal recessive (2) X-linked recessive  
 (3) Maternal imprinting (4) Paternal imprinting

Q.126 In a population that is in Hardy weinberg equilibrium, the frequency of a recessive allele for a certain hereditary trait is 0.20. What percentage of the individual in the next generation would be expected to show the dominant trait :-

- (1) 16% (2) 32% (3) 64% (4) 96%

Q.127 A pedigree is shown below for a disease that is autosomal recessive. The genetic make up of the first generation :-



- (1) AA, aa (2) Aa, Aa (3) Aa, aa (4) aa, aa

- Q.128 In a random mating population frequency of disease causing recessive allele is 80%. What would be the frequency of carrier individual in population :-  
 (1) 64% (2) 32% (3) 16% (4) 100%
- Q.129 Differentiation of organs and tissues in a developing organism, is association with :  
 (1) Developmental mutations (2) Differential expression of genes  
 (3) Lethal mutations (4) Deletion of genes
- Q.130 A gene containing multiple exons and at least one intron is termed as :  
 (1) split gene (2) operator gene (3) synthetic gene (4) epistatic gene
- Q.131 *E. coli* cells with a mutated *z* gene of the lac operon cannot grow in medium containing only lactose as the source of energy because  
 (1) They cannot synthesize functional betagalactosidase.  
 (2) They cannot transport lactose from the medium into the cell.  
 (3) The lac operon is constitutively active in these cells.  
 (4) In the presence of glucose, *E. coli* cells do not utilize lactose.
- Q.132 Functioning of structural genes is controlled by :  
 (1) Operator (2) Promoter (3) Ligase (4) Regulator gene
- Q.133 Jumping genes are found in :  
 (1) eukaryotes (2) bacteriophage  
 (3) bacteria (4) eukaryotes and prokaryotes
- Q.134 The genes that keeps on changing-their location on chromosomes are known as :  
 (1) Jumping genes (2) Duplicate genes (3) Lethal genes (4) Split genes
- Q.135 DNA fingerprinting refers to :  
 (1) Techniques used for identification of fingerprints of individuals  
 (2) Molecular analysis of profiles of DNA samples  
 (3) Analysis of DNA samples using imprinting devices  
 (4) Techniques used for molecular analysis of different specimens of DNA
- Q.136 Which step does not involve in DNA finger printing  
 (1) Southern blotting (2) Gel electrophoresis  
 (3) Restriction enzyme digestion (4) Northern blotting
- Q.137 The technique of transferring DNA fragment separated on agarose gel to a synthetic membrane such as nitrocellulose is known as  
 (1) Northern blotting (2) Southern blotting (3) Western blotting (4) Dot blotting
- Q.138 Satellite DNA is useful tool in :  
 (1) Forensic science (2) Genetic engineering  
 (3) Organ transplantation (4) Sex determination

- Q.139 The transfer of protein from electrophoretic gel to nitrocellulose membrane is known as :  
 (1) transferase                    (2) northern blotting    (3) western blotting    (4) southern blotting
- Q.140 Read the following four statements (A-D):  
 (A) In transcription, adenosine pairs with uracil.  
 (B) Regulation of lac operon by repressor is referred to as positive regulation.  
 (C) The human genome has approximately 50,000 genes.  
 (D) Haemophilia is a sex-linked recessive disease.  
 How many of the above statements are right?  
 (1) Four                            (2) One                            (3) Two                            (4) Three

## AIIMS Special

### Instructions for following questions (Q.141 to Q.155).

- (1) If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).
- (2) If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).
- (3) If Assertion is true statement but Reason is false, then mark (3).
- (4) If both Assertion and Reason are false statements, then mark (4).

- Q.141 **Assertion :** Mendel gave postulates like "principles of segregation and principles of independent assortment" after studying seven pairs of contrasting traits in garden pea.  
**Reason :** He was lucky in selecting seven characters in pea that were located on seven different chromosomes.
- Q.142 **Assertion :** Test cross is the tool for knowing linkage between genes.  
**Reason :** Monohybrid test cross gives two phenotypes and two genotypes.
- Q.143 **Assertion :** Marfan syndrome is caused by recessive mutant pleiotropic gene.  
**Reason :** Gene mutation leads to more synthesis of fibrillin proteins.
- Q.144 **Assertion :** In snapdragon, F<sub>1</sub> plants do not have red or white flowers.  
**Reason :** It is intermediate inheritance with neither of the two alleles of a gene being dominant over each other.
- Q.145 **Assertion :** *en block* inheritance of all genes located on the same chromosome may occur in some organisms.  
**Reason :** Dihybrid test cross will have only two phenotypes.
- Q.146 **Assertion :** Morgan's cross III was conducted in *Drosophila* to locate genes on chromosome for white eye colour.  
**Reason :** The cross was done between red eyed hybrid female and white eyed male.
- Q.147 **Assertion :** Antlers in male deer are sex influenced traits.  
**Reason :** These are controlled by autosomal genes which are influenced by the sex of bearer.

- Q.148 **Assertion :** One drum stick per nucleus is present in the neutrophil of normal female.  
**Reason :** It is absent in the neutrophil of male.
- Q.149 **Assertion :** Blood group phenotype is controlled by presence or absence of antigens present on surface coating of ABC.  
**Reason :** These antigens are of three types and found in the oligosaccharides rich head regions of a glycoprotein.
- Q.150 **Assertion :** XX - XY type sex determination is found in *Coccinia indica*.  
**Reason :** Male plant is produced only when Y chromosome is present irrespective of the number of X chromosome.
- Q.151 **Assertion :** *Drosophila melanogaster* is widely used in genetic research.  
**Reason :** *Drosophila melanogaster* is readily available insect.
- Q.152 **Assertion :** In humans, the gamete contributed by the male determines whether the child produced will be male or female.  
**Reason :** Sex in humans is a polygenic trait depending upon a cumulative effect of some genes on X-chromosome and some on Y-chromosome.
- Q.153 **Assertion :** A father may be a haemophilic only if his mother is carrier.  
**Reason :** The father cannot pass on a sex-linked gene to his son.
- Q.154 **Assertion :** An organism with lethal mutation may not even develop beyond the zygote stage.  
**Reason :** All types of gene mutations are lethal.
- Q.155 **Assertion :** Cancer cells are virtually immortal until the body in which they reside dies.  
**Reason :** Cancer is caused by damage to genes regulating the cell division cycle.

**ANSWER KEY**

Q.1	2	Q.2	2	Q.3	2	Q.4	1	Q.5	4	Q.6	3	Q.7	3
Q.8	3	Q.9	3	Q.10	1	Q.11	4	Q.12	2	Q.13	2	Q.14	2
Q.15	4	Q.16	2	Q.17	4	Q.18	2	Q.19	3	Q.20	2	Q.21	2
Q.22	2	Q.23	4	Q.24	3	Q.25	1	Q.26	1	Q.27	2	Q.28	4
Q.29	1	Q.30	3	Q.31	1	Q.32	2	Q.33	1	Q.34	2	Q.35	2
Q.36	1	Q.37	4	Q.38	3	Q.39	2	Q.40	1	Q.41	3	Q.42	2
Q.43	2	Q.44	2	Q.45	1	Q.46	4	Q.47	2	Q.48	3	Q.49	1
Q.50	1	Q.51	1	Q.52	2	Q.53	4	Q.54	2	Q.55	2	Q.56	4
Q.57	3	Q.58	3	Q.59	3	Q.60	4	Q.61	3	Q.62	2	Q.63	3
Q.64	3	Q.65	3	Q.66	2	Q.67	3	Q.68	3	Q.69	1	Q.70	4
Q.71	1	Q.72	2	Q.73	2	Q.74	2	Q.75	3	Q.76	1	Q.77	3
Q.78	2	Q.79	4	Q.80	3	Q.81	2	Q.82	2	Q.83	3	Q.84	3
Q.85	2	Q.86	4	Q.87	2	Q.88	2	Q.89	2	Q.90	2	Q.91	4
Q.92	3	Q.93	2	Q.94	2	Q.95	1	Q.96	4	Q.97	2	Q.98	4
Q.99	2	Q.100	2	Q.101	3	Q.102	3	Q.103	1	Q.104	1	Q.105	4
Q.106	2	Q.107	1	Q.108	1	Q.109	3	Q.110	3	Q.111	3	Q.112	2
Q.113	3	Q.114	3	Q.115	2	Q.116	4	Q.117	2	Q.118	2	Q.119	2
Q.120	1	Q.121	2	Q.122	3	Q.123	1	Q.124	3	Q.125	3	Q.126	4
Q.127	2	Q.128	2	Q.129	2	Q.130	1	Q.131	1	Q.132	4	Q.133	4
Q.134	1	Q.135	2	Q.136	4	Q.137	2	Q.138	1	Q.139	3	Q.140	3
Q.141	3	Q.142	2	Q.143	4	Q.144	1	Q.145	1	Q.146	3	Q.147	4
Q.148	2	Q.149	2	Q.150	1	Q.151	2	Q.152	3	Q.153	1	Q.154	3
Q.155	2												