Chapter 01 Principles of Inheritance and Variation

TOPIC WISE QUESTIONS

MENDELISM

Q.1 F_1 progeny of Mendelian dihybrid cross produces:
(1) Two types of pollen grains
(2) Four genotypes of gametes
(3) Two types of eggs
(4) Four types of pollens only

Q.2 When Mendel self hybridised the F_1 plants (RrYy), he found that dominant and recessive traits of one character are segregated in:
(1) 9 : 1 ratio (2) 3 : 3 ratio
(3) 10 : 6 ratio (4) 3 : 1 ratio

Q.3 Mendel published his work on inheritance of characters in 1865 but it remained unrecognized till 1900 because :
(a) He could not provide any physical proof for the existence of factors
(b) His concept of factors as stable, discrete units that controlled the expression of traits did not find acceptance from the contemporaries
(c) Mendel's approach of using mathematics to explain biological phenomenon was totally old
(d) Communication was not easy (as it is now)
(1) (a), (b) and (c) are correct
(2) (c) and (d) are correct
(3) (a), (b) and (d) are correct
(4) Only (a) is correct

Q.4 Heterozygous tall and violet flowered pea plants were selfed and total 512 seeds are collected. What will be total number of seeds for both heterozygous traits?
(1) 128 (2) 256 (3) 384 (4) 64

Q.5 Mark the odd one (with respect to F_2 generation of Mendelian dihybrid cross):
(1) Frequency of TtRR genotype = 12.5%
(2) Frequency of ttrr genotype = 6.25%
(3) Frequency of TTRR genotype = 6.25%
(4) Frequency of ttRr genotype = 25%

Q.6 Mendel studied seven pair of contrasting traits in Pea plant. Which is correct option in given alternatives?
(1) 2 characters flower based, 2 colour based, 3 seed based, 1 height based
(2) 2 characters flower based, 3 colour based, 1 height based, 2 seed based, 2 pod based
(3) 3 colour based, 1 flower based, 3 height based
(4) 3 Characters pod based, 2 stem based, 1 height based, 3 colour based

Q.7 Select incorrect one (w.r.t. reciprocal cross):
(1) To know whether the alleles are present on sex chromosomes or autosomes.
(2) It is made to eliminate to effect of nuclear trait.
(3) Two individuals with contrast genotypes are involved.
(4) Results are not changed for autosomal traits.

Q.8 Mendel conducted hybridisation experiments on garden peas between
(1) 1756 – 1763 (2) 1856 – 1863
(3) 1656 – 1663 (4) 1956 – 1963

Q.9 Which of the following combination seems to have some linkage in character selected by Mendel?
(1) Stem height and pod colour
(2) Flower colour and flower position
(3) Seed shape and seed colour
(4) Plant height and pod shape

Q.10 A diploid organism is heterozygous for five loci and homozygous for 2 loci, how many types of gametes can be produced?
(1) 128 (2) 32 (3) 4 (4) 14

Q.11 In F_2 generation of a Mendelian dihybrid cross (TTRR x ttrr) :
(1) Tall plants and violet flowered plants are obtained in 1 : 1 frequency
(2) Ratio of parental and non-parental plants is 1 : 15
(3) Recombinant plants are obtained in 1 : 1 frequency
(4) More than one option is correct

Q.12 When a heterozygous tall pea plant of F_1 generation upon self fertilization produces tall and dwarf phenotypes. It proves the principle of:
(1) Dominance
(2) Segregation
(3) Independent assortment
(4) Inheritance & purity of gametes

Q.13 A cross between AaBB X aaBB yields a genotypic ratio of :
(1) 1 AaBB: 1 aaBB
(2) 1 AaBB : 3 aaBB
(3) 3 AaBB : 1 aa BB
(4) All AaBb

Q.14 How many types & in what ratio the gametes are produced by a dihybrid heterozygous :
(1) 4 types in the ratio of 9:3:3:1
(2) 2 types in the ratio of 3 : 1
(3) 3 types in the ratio of 1:2:1
(4) 4 types in the ratio of 1:1:1:1

Q.15 How many gametes are produced in F_1 generation of a trihybrid :
(1) 3 (2) 4 (3) 8 (4) 16

Q.16 Which genotype represents a true dihybrid condition :
(1) tt rr (2) Tt rr (3) Tt Rr (4) TT Rr

Q.17 In a cross between a pure tall plant with green pod & a pure short plant with yellow pod. How many short plants are produced in F_2 generation out of 16 :
(1) 1 (2) 3 (3) 4 (4) 9

Q.18 In a dihybrid cross between AABB and aabb the ratio of AABB, AABb, aaBb, aabb in F_2 generation is :
(1) 9 : 3 : 3 : 1 (2) 1 : 1 : 1 : 1
(3) 1 : 2 : 2 : 1 (4) 1 : 1 : 2 : 2

Q.19 Crossing AABB and aabb, the probability of AaBb would be in F_2 generation:
(1) 1/16 (2) 2/16 (3) 8/16 (4) 4/16

Q.20 If 120 Plants of *Antirrhinum* plants are produced on crossing pure red and pure white flowered plants, than the ratio of offsprings will be:
(1) 90 Red : 30 White flowered
(2) 30 Red : 90 White flowered
(3) 60 pink : 60 White flowered
(4) All pink flowered

Q.21 An individual with two identical members of a pair of genetic factors is called:
(1) Heteromorphic (2) Heterozygote
(3) Homomorphic (4) Homozygote

Q.22 Two allelic genes are located on:
(1) The same chromosome
(2) Two homologous chromosomes
(3) Two non-homologous chromosomes
(4) Any two chromosomes

Q.23 Mendel's law of segregation is based on separation of alleles during:
(1) Gamete formation
(2) Seed formation
(3) Pollination
(4) Embryonic development

Q.24 Which technique is used by Mendel for hybridisation:
(1) Emasculation (2) Bagging
(3) Protoplast fusion (4) 1 & 2 both

Q.25 When flowers are unisexual then emasculation is done in:
(1) Female (2) Male
(3) 1 and 2 both (4) None of these

Q.26 How many plants are dihybrid in F_2 generation of dihybrid cross:
(1) One (2) Two (3) Four (4) Sixteen

Q.27 When a plant have two alleles of contrasting characters, it is called:
(1) Homozygous (2) Dioecious
(3) Heterozygous (4) Monoecious

Q.28 From a single ear of corn, a farmer planted 200 kernels which produced 140 tall & 40 short plants. The genotypes of these offsprings are most likely :
(1) TT, Tt and tt (2) TT and tt
(3) TT and Tt (4) Tt and tt

Q.29 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.30 Heterozygous tall plants were crossed with dwarf plants. What will be the ratio of dwarf plants in the progeny :
(1) 50% (2) 25% (3) 75% (4) 100%

Q.31 If the cell of an organism is heterozygous for two pairs of genes represented by Aa, Bb, undergoes meiosis, then the possible genotypic combination of gametes will be :
(1) AB, Ab, aB, ab (2) AB, ab
(3) Aa, Bb (4) A, a, B, b

Q.32 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.33 Genetic constitution of an individual is represented by :
(1) Genome (2) Genotype
(3) Phenotype (4) Karyotype

Q.34 Genes do not occur in pairs in:
(1) Zygote (2) Somatic cell
(3) Endosperm cell (4) Gamete

Q.35 According to Mendelism, which character is showing dominance:
(1) Terminal position of flower
(2) Green colour in seed coat
(3) Wrinkled seeds
(4) Green pod colour

Q.36 A gene said to be dominant if :
(1) It express its effect only in homozygous stage.
(2) It is expressed only in heterozygous condition
(3) It is expressed both in homozygous and heterozygous condition.
(4) It is never expressed in any condition.

Q.37 Mendel's principle of segregation means that the germ cells always receive
(1) Either one allele of father or one allele of mother
(2) One pair to alleles
(3) One quarter of the genes
(4) Any pair of alleles

Q.38 If a homozygous tall plant is crossed with a dwarf plant, what shall be the ratio of plants in off springs :
(1) All heterozygous tall
(2) Two tall and Two dwarf
(3) 1 : 2 : 1
(4) All homozygous dwarf

Q.39 The process of mating between closely related individuals is :
(1) Out-breeding (2) Inbreeding
(3) Hybridisation (4) Heterosis

Q.40 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.41 An inherited character and its detectable variant is termed as :
(1) Unit factor (2) Trait
(3) Genetic profile (4) Genotypic character

Q.42 When an F_1 individual is crossed with its either of the two parent. Then it is known as :
(1) Test cross (2) Back cross
(3) Reciprocal cross (4) Monohybrid cross

Q.43 How many types of genotypes are formed in F_2 progeny obtained from self pollination of a dihybrid F_1 :
(1) 9 (2) 3 (3) 6 (4) 1

Q.44 If a dwarf plant is treated with gibberellins it becomes tall and this plant now crosses with pure tall plant then progeny of first generation (F_1) is :
(1) All dwarf
(2) All tall
(3) 75% tall and 25% dwarf
(4) 75% dwarf and 25% tall

Q.45 Which of the following is correct for test-cross
(1) TT × Tt (2) tt × TT
(3) Tt × tt (4) tt × tt

Q.46 If a cross is made between AA and aa, the nature of F_1 progeny will be :
(1) Genotypically AA, phenotypically a
(2) Genotypically Aa, phenotypically a
(3) Genotypically Aa, phenotypically A
(4) Genotypically aa, phenotypically A

Q.47 A pure tall and a pure dwarf plant were crossed to produce off springs. Off springs were self crossed, then find out the ratio between true breeding tall to true breeding dwarf :
(1) 1 : 1 (2) 3 : 1
(3) 2 : 1 (4) 1 : 2 : 1

Q.48 If hybrid red flowered plants of pea are crossed back to pure red flowered parent, the progeny will show :
(1) All red flowered plants
(2) White flowered plants
(3) 50% red and 50% white flowered plants
(4) 3 Red : 1 white flowered plants

Q.49 A cross between pure tall pea plant with green pods and dwarf pea with yellow pods will produce tall____F_2 plants, out of 16 :
(1) 15 (2) 13 (3) 12 (4) 7

Q.50 Mendel's Principle of segregation means that the germ cells always receive:
(1) One pair of alleles
(2) One quarter of the genes
(3) One of the paired alleles
(4) Any pair of alleles

Q.51 How many types of genetically different gametes will be produced by a heterozygous plant having the genotype AABbCc?
(1) Two (2) Four (3) Six (4) Nine

Q.52 Mendel observed that all the F_1 progeny plants:
(1) Resembled either one of the parents
(2) Resembled neither of the parents
(3) Resembled both of the parents
(4) Shows 3 : 1 ratio

Q.53 According to Mendel, "factors" or "genes" :
(1) Are the units of inheritance
(2) Contain information that is required to express a particular trait
(3) Both 1 and 2
(4) Do not contain information required to express a particular trait.

Q.54 The segregation of alleles is a random process and so there is a _____ chance of a gametes containing either allele:
(1) 25% (2) 50%
(3) 75% (4) 100%

Q.55 The phenotype of any character will not be affected if the modified allele produces:
(1) Normal enzyme
(2) Non-functional enzyme
(3) No-enzyme at all
(4) 2 and 3 both

Q.56 Genes which code for a pair of contrasting traits are known as :-
(1) Alleles (2) Non alleles
(3) Pseudoalleles (4) Isoalleles

Q.57 The recessive characters are :
(1) Only expressed in heterozygous condition
(2) Only expressed in homozygous condition
(3) Do not blend in heterozygous condition
(4) Always impure

GENE INTERACTIONS

Q.58 In garden pea, starch is synthesised effectively in:
(1) Heterozygous round seeded plants
(2) Homozygous round seeded plants
(3) Wrinkled seeded plants
(4) Pure and hybrid round seeded plants

Q.59 When a pink flowered *Antirrhinum* plant is test crossed, then phenotypic ratio in resulting progenies is :
(1) 1 Red: 1 White (2) 3 Red: 1 White
(3) 2 Pink : 1 White (4) 1 Pink : 1 White

Q.60 Mark the correct statement (with respect to sickle cell anaemia) :
(1) Homozygous individuals for Hb^SHb^S are apparently unaffected
(2) Heterozygous individuals (Hb^AHb^S) appear apparently unaffected
(3) Heterozygous individuals are affected as well as carrier
(4) Homozygous individuals for Hb^A show the diseased phenotype

Q.61 The defect sickle-cell anaemia is caused by the _____ of glutamic acid by valine at the 6^{th} position of the_____ globin chain of the haemoglobin molecule :
(1) Substitution, β (2) Deletion, α
(3) Duplication, β (4) Translocation,α

Q.62 In incomplete dominance :
(1) Dominant trait is completely expressed in F_1 generation
(2) Phenotypic and genotypic ratio are different
(3) Two dominant alleles are needed to express the complete dominant trait
(4) F_1 individuals have the equal traits of both parents

Q.63 Progeny with blood group 'O' can not be obtained in cross :
(1) A x A (2) A x B
(3) O x AB (4) B x B

Q.64 In *Mirabilis* and *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.65 In *Mirabilis jalapa* when homozygous red flowered and white flowered plants are crossed, all F_1 plants have pink coloured flowers. In F_2 produced by selfing of F_1 plants, red, pink, white flowered plants would appear respectively in the ratio of :
(1) 1:1:2 (2) 2:1:1 (3) 1:0:1 (4) 1:2:1

Q.66 Incomplete dominance occurs in :
(1) *Mirabilis* (2) *Antirrhinum*

(3) *Andulasion fowl* (4) All of the above

Q.67 Which cross yields red, white and pink flowers variety of dog flower :
(1) RR X Rr (2) Rr X RR
(3) Rr X Rr (4) Rr X rr

Q.68 What shall be ratio in offspring when a roan cow is crossed with a white bull :
(1) 1:2:1 (2) 3:1 (3) 1:1 (4) All roan

Q.69 In a dihybrid cross, when one pair of alleles show incomplete dominance, genotypic ratio comes to :
(1) 3 : 6 : 3 : 1 : 2 : 1
(2) 1 : 2 : 2 : 4 : 1 : 2 : 1 : 2 : 1
(3) 9 : 3 : 3 : 1
(4) 1 : 2 : 1

Q.70 Which of the following conditions represent a case of co-dominant genes :
(1) A gene expresses itself, suppressing the phenotypic effect of its alleles
(2) Genes that are similar in phenotypic effect when present separately, but when together interact to produce a different trait
(3) Allele, both of which interact to produce a trait, which may resemble either of the parental type.
(4) Alleles, each of which produces an independent effect in heterozygous condition.

Q.71 ABO blood group is an example of :
(1) Epistasis
(2) Multiple allelism
(3) Pleiotropism
(4) Complementary genes

Q.72 A child has blood group 'O'. His parents blood group cannot be :
(1) B and O (2) A and O
(3) AB (4) A and B

Q.73 If one parent has blood group A and the other parent has blood group B. The offsprings have which blood group :
(1) AB only (2) O only
(3) B only (4) A, B, AB, O

Q.74 A child of O blood group, has B-blood group father, the genotype of father would be :
(1) I^0I^0 (2) I^BI^B (3) I^AI^B (4) I^BI^0

Q.75 When a red flowered plant was cross pollinated by white flowered one and the offspring were self pollinated to obtain a phenotypic ratio of 1:2:1, it has to be a case of :
(1) Incomplete dominance
(2) Dominance
(3) Recessive epistasis
(4) Pleiotropic effect of genes

Q.76 A gene that shows its effect on more than one character is :
(1) Polygene (2) Pleiotropic gene
(3) Multifactor gene (4) Multiple gene

Q.77 In multiple allele system a gamete possesses :
(1) Two alleles (2) Three alleles
(3) One allele (4) Several alleles

Q.78 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.79 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.80 (A) Pleiotropic genes have multiple phenotypic effect.
(B) Multiple alleles exhibit same phenotypic expression.
(C) Polygenes exhibit continuous variation.
(1) Statement (A), (B) and (C) are correct
(2) Statement (A), (C) correct and (B) is incorrect
(3) Statement (A), (B) and (C) are incorrect
(4) Statement (B) and (C) are correct and (A) is incorrect

Q.81 Sickle cell anaemia induces due to :
(1) Change of Amino Acid in α – chain of Haemoglobin
(2) Change of Amino Acid in β – chain of Haemoglobin
(3) Change of Amino Acid in both α and β chain of Haemoglobin
(4) Change of Amino acid either α or β chain of Haemoglobin

Q.82 Incomplete dominance is absent in:
(1) *Pisum sativum*
(2) *Antrrhinum majus*

(3) Human ABO blood groups
(4) Both *Pisum sativum* and *Antirrhinum majus*

Q.83 A man with blood group B marries a female with blood group A and their first child is having blood group B. What is the genotype of child :
(1) I^AI^B (2) I^AI^O (3) I^BI^O (4) I^BI^B

Q.84 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.85 If mother has blood group B, father has A group, the offspring will be of :
(1) A (2) O
(3) AB (4) Any of the above

Q.86 Sickel cell anemia is the result of _____ mutation in the haemoglobin gene:
(1) Frame shift (2) Deletion
(3) Point (4) None of the above

Q.87 In the inheritance of flower colour in dog flower plant, the F_1 has a phenotype that:
(1) Resembles both of the parents
(2) Does not resemble either of the two parents
(3) Resembles with only one parent
(4) 1 and 3 both

Q.88 The three different alleles of human ABO blood types will produce how many genotypes & phenotypes respectively :
(1) 4 and 6 (2) 6 and 4
(3) 6 and 6 (4) 4 and 4

Q.89 Find out the correct match :
(1) F_1 resembled either of the parents - Dominance
(2) F_1 resembled in between -incomplete dominance
(3) F_1 resembled both parent - Co-dominance
(4) All are correct

Q.90 Which of the following condition is true for codominance:
(1) Phenotype of F_1 resembled either of the two parents
(2) Phenotype of F_1 did not resemble either of two parents
(3) Phenotype of F_1 resembles both parents
(4) More than one option is correct

Q.91 In sickle cell anaemia:
(1) The mutant haemoglobin molecule undergoes polymerisation under low oxygen tension causing the change in the shape of RBC
(2) Substitution of Glutamic acid by valine at the sixth position of the α-chain of haemoglobin
(3) The mutant haemoglobin undergoes polymerization under high oxygen tension causing the change in shape of RBC
(4) α-globin chain is modified

Q.92 In case of ABO blood group allele I^A and I^B if present together then:
(1) Ony I^A allele expresses
(2) Only I^B allele expresses
(3) Both I^A and I^B alleles express
(4) None of these

POLYGENIC INHERITANCE

Q.93 A polygenic inheritance in human beings is:
(1) Skin colour
(2) Sickle cell anaemia
(3) Colour blindness
(4) Phenylketonuria

Q.94 Inheritance of height in human beings is an example of:
(1) Complementary gene
(2) Monogenic inheritance
(3) Polygenic inheritance
(4) Mendelian inheritance

Q.95 In polygenic inheritance trait which controlled by three pairs of genes. Two individuals which are heterozygous for three alleles, crossed each other. Such type of cross produces the phenotypic ratio:
(1) 1 : 2 : 1 (2) 9 : 3 : 3 : 1
(3) 1 : 4 : 6 : 4 : 1 (4) 1 : 6 : 15 : 20 : 15.: 6 : 1

Q.96 A polygenic trait is controlled by 3 genes A, B and C. In a cross AaBbCc x AaBbCc, the phenotypic ratio of the offsprings was observed as:
1 : 6 : x : 20 : x : 6 : 1
What is the possible value of x?
(1) 3 (2) 9 (3) 15 (4) 25

CHROMOSOMAL THEORY OF INHERITANCE, LINKAGE, SEX LINKAGE & RECOMBINATION

Q.97 Which of the following statement for chromosomal theory of inheritance is incorrect?
(1) Pairing and separation of a pair of chromosomes would lead to the segregation of a factor they carried
(2) Behaviour of chromosomes is identical to the behaviour of genes
(3) The two alleles of a gene pair are located on homologous sites on homologous chromosomes
(4) Chromosomes as well as genes occur in pairs

Q.98 Fruit flies are one of the best materials for genetic studies because of all, except :
(1) Ability to grow on simple synthetic medium in the laboratory
(2) Short life span
(3) Production of a large number of progeny in each mating
(4) Presence of few externally visible and identifiable contrasting traits

Q.99 Generation of non-parental gene combinations is termed as :
(1) Linkage (2) Polyploidy
(3) Recombination (4) Aneuploidy

Q.100 Which of the following phenomena leads to variation in DNA?
(1) Linkage, mutation
(2) Recombination, linkage
(3) Mutation, recombination
(4) Aneuploidy, linkage

Q.101 Which of the following trait shows transmission from carrier female to male progeny ?
(1) Autosomal dominant
(2) X-linked recessive
(3) Y-linked recessive
(4) X-linked dominant

Q.102 __(A)___used the frequency of recombination between gene pairs on the __(B)__ as a measure of the distance between genes and mapped their position on the chromosome.

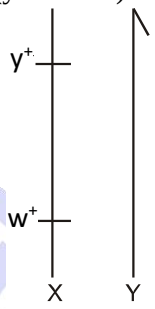
(A)	(B)
(1) Morgan	Same chromosome
(2) Sturtevant	Different chromosomes
(3) Morgan	Different chromosomes
(4) Sturtevant	Same chromosome

Q.103 In which of the following disorder a single protein that is a part of the cascade of proteins involved in blood clotting is affected?
(1) Thalassemia (2) Sickle-cell anaemia
(3) Haemophilia (4) Phenylketonuria

Q.104 A normal woman, whose father had colour blindness, married a normal man. What is the chance of occurrence of colour blindness in the progeny ?
(1) 25% (2) 50% (3) 100% (4) 75%

Q.105 The chromosome maps are not accurate maps because
(1) Crossing over frequency is higher than recombination frequency
(2) One crossing over interferes and increases the frequency of nearby crossing over
(3) Crossing over frequency decreases towards the ends of chromosome
(4) Heterochromatin increases crossing over

Q.106 How many types of gametes will be produced by a ♂ *Drosophila* having following arrangement of two genes (y^+ and w^+) on X-chromosome?



(1) 2 (2) 4 (3) 1 (4) 8

Q.107 What is the inheritance of colour blindness of offsprings where both parents having a normal vision but mother has a recessive gene for colourblindness:

Son	Daughter
(1) 50%	Nil
(2) 100%	Nil
(3) Nil	100%
(4) Nil	Nil

Q.108 What would be the nature of children if a colour blind woman marries a normal man :
(1) Colour blind daughter & normal sons
(2) Colour blind sons and carrier daughters
(3) Normal sons & carrier daughters
(4) Normal sons & Normal daughters

Q.109 A colourblind daughter is born when :
(1) Father is colour blind, mother is normal
(2) Mother is colour blind, father is normal
(3) Mother is carrier, father is normal
(4) Mother is carrier, father is colour blind

Q.110 Which of the following is not a sex linked characters :
(1) Haemophilia (2) Colour blindness
(3) Hypertrichosis (4) Baldness

Q.111 A woman with normal vision marries a man with normal vision and gives birth to a colourblind son. Her husband dies and she marries a colourblind man. What is the probability of her children having the abnormality ?

(1) 50% colourblind sons + 50% colourblind daughters
(2) All sons colourblind and daughter carrier
(3) All daughter colourblind and sons normal
(4) 50% sons colour blind and all daughters normal

Q.112 In a cross between individuals homozygous for (a, b) and wild type (+ +). In this cross 700 out of 1000 individuals were of parental type. Then the distance between a and b is:
(1) 70 map unit (2) 35 map unit
(3) 30 map unit (4) 15 map unit

Q.113 What ratio is expected in offsprings if father is colour blind and mother's father was colour blind :
(1) 50% daughter - colour blind
(2) All the sons are colour blind
(3) All the daughters colour blind
(4) All the sons are normal

Q.114 There are three genes a, b, c percentage of crossing over between a and b is 20%, b and c is 28% and a and c is 8%. What is the sequence of genes on chromosome :
(1) b, a, c (2) a, b, c (3) a, c, b (4) b, c, a

Q.115 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

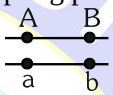
Q.116 Genetic Map is one that:
(1) Establishes sites of the genes on a chromosome
(2) Establishes the various stages in gene evolution
(3) Shows the stages during the cell division
(4) Shows the distribution of various species in a region

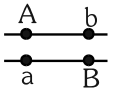
Q.117 One of the genes present exclusively on the X–chromosome in humans is concerned with:
(1) Baldness
(2) Red green colour blindness.
(3) Facial hair/Moustaches in males.
(4) Night blindness.

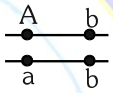
Q.118 The recessive genes located on X–chromosome in humans are always:
(1) Expressed in females
(2) Lethal
(3) Sub–lethal
(4) Expressed in males

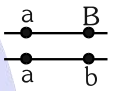
Q.119 A colourblind man marries with normal eyed woman where there is no historical record of colourblindness. The first offspring of this couple is daughter. Find out the possibility of appearance of colourblindness of this daughter?
(1) 50% (2) 25% (3) 0% (4) 75%

Q.120 If father shows normal genotype and mother shows a carrier trait for hemophilia:
(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.121 Which of the following show linkage group in coupling phase:
(1) 

(2) 

(3) 

(4) 

Q.122 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.123 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.124 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.125 If Mendel has chosen to study traits determined by linked genes he would not have discovered :
(1) Law of segregation

(2) Law of dominance
(3) Law of independent assortment
(4) Law of unit character

Q.126 The first attempt to show linkage in plants was done in :
(1) *Pisum sativum*
(2) *Lathyrus odoratus*
(3) *Zea mays*
(4) *Oenothera lamarckiana*

Q.127 If there were only parental combinations in F_2 of a dihybrid cross then Mendel might have discovered :
(1) Independent assortment
(2) Atavism
(3) Linkage
(4) Repulsion

Q.128 Chromosomal theory of inheritance was proposed by
(1) Sutton & Boveri (2) Sturtevant
(3) Morgan (4) Henking

Q.129 If distance between gene on chromosome is more, then gene shows:
(1) Weak linkage (2) Strong linkage
(3) Less crossing (4) 1 and 3 both

Q.130 Linked gene shows :
(1) Always parental combination
(2) Sometimes new combinations
(3) Always new combination
(4) New combination more

Q.131 The number of linkage groups in a cell having 10 pairs of chromosomes are :
(1) 5 (2) 10 (3) 15 (4) 20

Q.132 The association of parental characters combinations in the offsprings of a dihybrid is in excess to non-parental combinations is said to be due to :
(1) Co-dominance (2) Blending inheritance
(3) Linkage (4) Duplicate genes

Q.133 A phenomenon which works opposite to the linkage is :
(1) Independent assortment
(2) Crossing-over
(3) Segregation
(4) Mutation

Q.134 Cross over value (COV) of gene A and B is 5% while COV of genes B and C is 15% the possible sequence of these genes on chromosome is :
(1) A-B-C (2) C-A-B
(3) B-C-A (4) Both (1) and (2)

Q.135 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.136 Which one of the following is associated with sex-linked inheritance :
(1) Night-blindness (2) Haemophilia
(3) Astigmatism (4) Polydactyly

Q.137 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.138 If a colourblind woman marries with a normal man. The offspring will be:
(1) All colourblind
(2) All daughters will be normal and all son will be colourblind
(3) All normal
(4) All daughters will be colourblind and all sons will be normal

Q.139 If a colourblind man is married to a normal woman (Absence of gene of colourblindness on its X-chromosomes), 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.140 If a colour blind man marries a girl who is normal (homozygous) for this character, then genotypically :
(1) Sons and daughters will be normal
(2) Sons will be colour blind, daughters will be normal
(3) Sons will be normal, daughters will be carriers
(4) Both sons and daughters will be colour blind

Q.141 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) and (3)

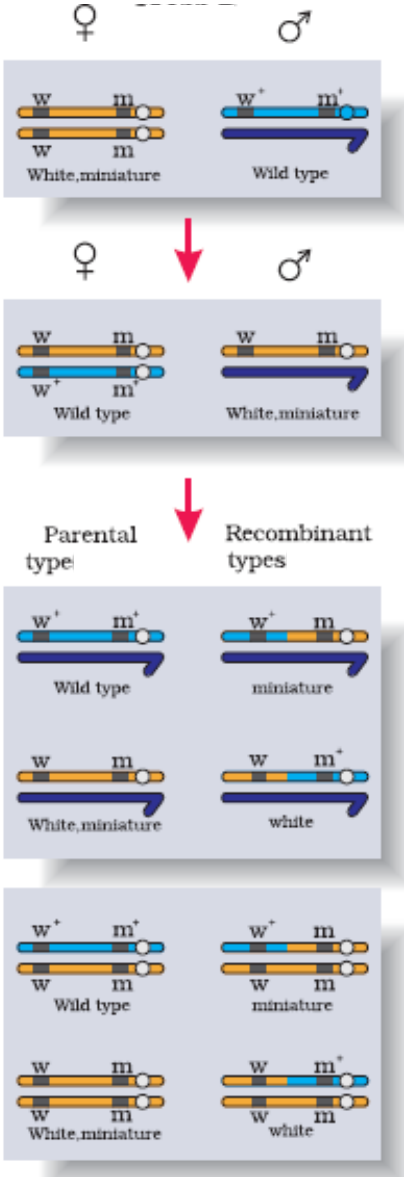
Q.142 Presence of recombinants is due to:
(1) Crossing over
(2) Linkage
(3) Lack of independent assortment
(4) All of the above

Q.143 Morgan coined the term_____ to describe the physical association of genes on a chromosome and the term_____ to describe the generation of non-parental gene combinations :
(1) Recombination; Linkage
(2) Recombination; Non-recombination
(3) Linkage; Non-recombination
(4) Linkage; Recombination

Q.144 Experimental verification of the chromosomal theory of inheritance done on the basis of work with:
(1) Pea plant (2) Sweet pea plant
(3) *Snapdragon* (4) *Drosophila*

Q.145 Morgan and his group found that when genes were grouped on the same chromosome, some genes were very tightly linked and showed :
(1) Very low recombination
(2) Higher recombination
(3) No recombination
(4) 100% parental combination

Q.146



On the basis of above cross, the percentage of parental type in F_2 generation is
(1) 98.7% (2) 37.2% (3) 62.8% (4) 1.3%

Q.147 The experimental verification of the chromosomal theory of inheritance was given by:
(1) Boveri (2) Sutton
(3) T.H. Morgan (4) Bateson

SEX DETERMINATION

Q.148 Initial clue about the genetic/chromosomal mechanism of sex-determination can be traced back to some of the experiments carried out in:
(1) Human beings (2) Birds
(3) Insects (4) Plants

Q.149 In which of the sex determination both male and female have same number of chromosomes?

(1) XY type (2) ZO type
(3) XO type (4) Both (1) and (3)

Q.150 Two different types of gametes in terms of the sex chromosomes are produced by :
(1) Female fruit fly
(2) Male butterfly
(3) Male human and female *Drosophila*
(4) Female birds

Q.151 Individuals having homomorphic sex chromosomes produce:
(1) Only one gamete in complete life span
(2) One type of gametes
(3) No gametes
(4) Two type of gametes

Q.152 How the sex of offsprings determined in humans:
(1) By sex chromosome of mother
(2) By size of ovum
(3) By size of sperm
(4) By sex chromosome of father

Q.153 Which of the following possess homogametic male:
(1) Plants (2) Man
(3) Insect (4) Birds

Q.154 Which chromosome set is found in male grass hopper:
(1) 2A + XY (2) 2A + XO
(3) 2A + YY (4) 2A + XX

Q.155 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.156 In honey bee, which of the following isn't formed by fertilization?
(1) Queen
(2) Workers
(3) Drones
(4) More than one option is correct.

Q.157 Which of the following represent heterogametic condition
(1) ZW female in birds
(2) XX female in *Drosophila*
(3) XX female in Grasshopper
(4) ZZ male in birds

Q.158 Which of the following symbols are used for representing sex chromosome of birds :
(1) ZZ – ZW (2) XX – XY
(3) XO – XX (4) ZZ – WW

Q.159 in honeybee males produce sperms by
(1) Meiosis (2) Mitosis
(3) Amitosis
(4) More than one option correct

Q.160 Sex determination in humans takes place by:
(1) Sex chromosomes of father
(2) Measurement of sperm
(3) Measurement of ovum
(4) Sex chromosomes of mother

Q.161 The number of chromosomes in female & male respectively in honeybee is
(1) 16, 16 (2) 16, 32
(3) 32, 16 (4) 32, 32

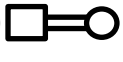
Q.162 Which of the following is responsible for sex determination in chick:
(1) Sperm (2) Egg
(3) Somatic cell (4) Every cell of body

Q.163 In which of the following sex is determined by female individual:
(1) Human (2) *Drosophila*
(3) Birds (4) Grasshopper

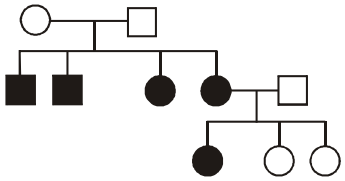
Q.164 Male heterogamy found in case of:
(1) XO type male in Grasshopper
(2) XY type male in human
(3) ZW male in birds
(4) 1 and 2 both

Q.165 In which of the following monosomic male is found:
(1) Human (2) Birds
(3) Honey bee (4) Grasshopper

GENETIC DISORDERS

Q.166 In pedigree analysis, symbol given for sex unspecified is:
(1)  (2)  (3)  (4) 

Q.167 In the given pedigree, Indicate whether the shaded symbols indicate dominant or recessive allele:



(1) Recessive
(2) Codominant
(3) Dominant
(4) It can be recessive or dominant both

Q.168 Match the following - (w.r.t. Pedigree analysis):

Column -I	**Column -II**
a. Solid symbol	(i) Carrier of sex linked trait
b. Horizontal line between symbols	(ii) Offspring
c. Horizontal line above the symbols	(iii) Trait to be studied
d. Dot in centre	(iv) Parents

(1) a(iv), b(iii), c(ii), d(i)
(2) a(ii), b(iii), c(iv), d(i)
(3) a(iii), b(iv), c(ii), d(i)
(4) a(i), b(ii), c(iv), d(iii)

Q.169 The inheritance of a particular trait is represented in the family tree over generations in
(1) Pedigree analysis (2) Linkage
(3) Recombination (4) Mutation

Q.170 If a cross is made between two individuals each having genotype Bb, two offsprings are obtained. Out of these first has dominant trait. What is the probability that the second offspring will exhibit recessive trait:
(1) 1/4 (2) 100 (3) Zero (4) 3/4

Q.171 Which one of the following character in man is controlled by recessive gene:
(1) Colourblindness
(2) Myotonic dystrophy
(3) Brachy-dactyly
(4) Curly hairs

Q.172 

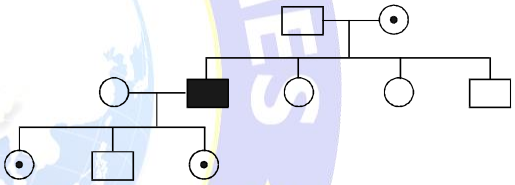
This symbol represents
(1) Sex specified
(2) Five unaffected offsprings
(3) Mating
(4) Normal male

Q.173 Failure of segregation of chromatid during cell division cycle results in the gain or loss of a chromosome(s), called
(1) Aneuploidy
(2) Polyploidy
(3) Euploidy
(4) More than one option is correct

Q.174 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%

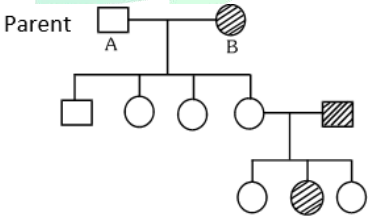
Q.175 A male human is heterozygous for autosomal genes A and B and is also hemizygous for haemophilic gene h. What proportion of his sperms will be abh:
(1) $\frac{1}{4}$ (2) $\frac{1}{8}$ (3) $\frac{1}{32}$ (4) $\frac{1}{16}$

Q.176 Predict from the following chart :



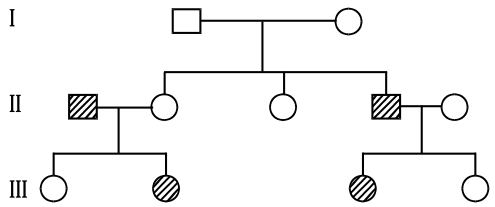
(1) Character is dominant and carried by X chromosome
(2) Character is carried by Y chromosome
(3) Character is sex linked recessive
(4) Character is autosomal recessive

Q.177 Given pedigree shows inheritance of autosomal recessive gene. What is the genotype of given parents :



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

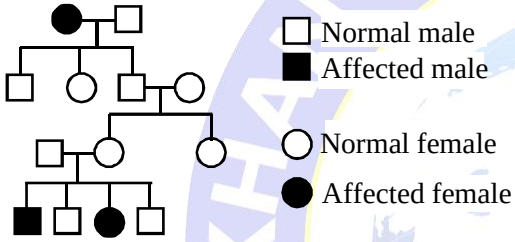
Q.178 A pedigree is shown below for a disease that is autosomal recessive. The genetic make up of the first generation:



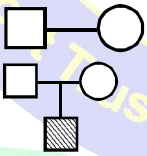
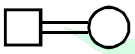
(1) AA, aa (2) Aa, Aa
(3) Aa, aa (4) aa, aa

Q.179 Which of the following is incorrect about thalassemia?
(1) Autosomal recessive trait
(2) Quantitative inheritance
(3) Two types α & β thalassemia
(4) Shows pleiotropy

Q.180 Study the pedigree given below and assign the type of inheritance of the trait:



(1) X-linked recessive
(2) Y-linked
(3) Autosomal recessive
(4) Autosomal dominant

Q.181 Which of the following symbol is used for mating between relatives (Consangeineous mating) :
(1) 
(2) 
(3) 
(4)

Q.182 Cystic fibrosis, Haemophilia and Thalassemia are:
(1) Chromosomal disorders
(2) Autosomal recessive disorders
(3) Mendelian disorders
(4) Autosomal dominant disorders

Q.183 Phenylketonuria is an inborn error of metabolism that is inherited as:
(1) Autosomal recessive trait
(2) Sex-linked dominant trait
(3) X-linked recessive trait
(4) Autosomal dominant trait

Q.184 Which of the following abnormalities is due to autosomal dominant mutation?
(1) Colour blindness
(2) Thalassemia
(3) Myotonic dystrophy
(4) Haemophilia

Q.185 Absence or excess or abnormal arrangement of one or more chromosomes results in :
(1) Point mutation
(2) Chromosomal disorders
(3) Mendelian disorders
(4) Gene mutation

Q.186 Mark the odd one w.r.t. syndrome which occur due to failure of segregation of homologous pair chromosomes during cell division cycle.
(1) Klinefelter's syndrome
(2) Down's syndrome
(3) Turner's syndrome
(4) Thalassemia

Q.187 Mark the correct match :
(1) Turner's syndrome - 46 + XO
(2) Phenylketonuria - 44 + XYY
(3) Klinefelter's syndrome - 44 + XXY
(4) Thalassemia - 44 + YO

Q.188 In which of the following disorders affected individuals possess 47 chromosomes?
(1) Turner's syndrome
(2) Klinefelter's syndrome
(3) Down's syndrome
(4) Both (2) and (3)

Q.189 In which of the following disorder gynecomastia symptom is seen in individuals?
(1) Down's syndrome
(2) Turner's syndrome
(3) Klinefelter's syndrome
(4) Phenylketonuria

Q.190 Allosomic trisomy condition is seen in :
(1) Turner's syndrome
(2) Klinefelter's syndrome
(3) Down's syndrome
(4) Both (2) and (3)

ANSWER KEY

TOPIC WISE QUESTIONS

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	2	4	3	1	4	2	2	2	4	2	4	2	1	4	3
Que.	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Ans.	3	3	3	4	4	4	2	1	4	4	3	3	1	4	1
Que.	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
Ans.	1	1	2	4	4	3	1	1	2	1	2	2	1	2	3
Que.	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
Ans.	3	1	1	3	3	2	1	3	2	1	1	2	2	4	2
Que.	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**
Ans.	1	3	3	1	4	4	3	3	2	4	2	3	4	4	1
Que.	**76**	**77**	**78**	**79**	**80**	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**
Ans.	2	3	2	3	2	2	3	3	4	4	3	2	2	4	3
Que.	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**	**101**	**102**	**103**	**104**	**105**
Ans.	1	3	1	3	4	3	2	4	3	3	2	4	3	1	1
Que.	**106**	**107**	**108**	**109**	**110**	**111**	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**
Ans.	1	1	2	4	4	1	3	1	1	3	1	2	4	3	2
Que.	**121**	**122**	**123**	**124**	**125**	**126**	**127**	**128**	**129**	**130**	**131**	**132**	**133**	**134**	**135**
Ans.	1	2	2	2	3	2	3	1	1	2	2	3	2	4	1
Que.	**136**	**137**	**138**	**139**	**140**	**141**	**142**	**143**	**144**	**145**	**146**	**147**	**148**	**149**	**150**
Ans.	2	3	2	3	3	2	1	4	4	1	3	3	3	1	4
Que.	**151**	**152**	**153**	**154**	**155**	**156**	**157**	**158**	**159**	**160**	**161**	**162**	**163**	**164**	**165**
Ans.	2	4	4	2	1	3	1	1	2	1	3	2	3	4	4
Que.	**166**	**167**	**168**	**169**	**170**	**171**	**172**	**173**	**174**	**175**	**176**	**177**	**178**	**179**	**180**
Ans.	1	1	3	1	1	1	2	1	1	2	3	1	2	4	3
Que.	**181**	**182**	**183**	**184**	**185**	**186**	**187**	**188**	**189**	**190**					
Ans.	3	3	1	3	2	4	3	4	3	2					