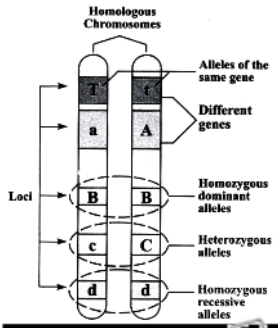


Chapter 22

Variation and Genetics

TOPIC WISE MULTIPLE CHOICE QUESTIONS
GENE, GENE POOL

KIPS MCQs

(1) Point out the structure that is responsible for the transmission of hereditary characteristics from the parents to the offspring:

(a) Alleles **(b)** Genes
(c) DNA **(d) All of the above**

(2) Jumping genes do not settle on their loci, they keep on hopping on different loci on the:

(a) Same chromosome **(b)** Other chromosome
(c) Both a & b **(d)** None of these

PAST PAPERS MCQs

(3) The gene pool consists of all alleles at all gene loci in all individuals of: (RWP 2017)

(a) Individual **(b)** Species
(c) Populaiton **(d)** Community'

(4) _____ if the form of appearance of a trait. (GRW 2017)

(a) Genotype **(b) Phenotype**
(c) Pleiotropic **(d)** Epistasis

(5) Locus is a: (SGD 2017, LHR 2021)

(a) Part is DNA **(b) Position of Gene**
(c) Partner of Gene **(d)** Complement of Gene

(6) The position of a gene on the chromosome is called its _____. (SGD 2017, GRW 2018, SGD 2018, SWL 2021, LHR2022)

(a) Allele **(b)** Phenotype
(c) Locus **(d)** Genotype

ENTRY TEST BASED MCQs

(7) Locus stands for: (UHS 2017)

(a) Position of gene on homologous chromosomes
(b) Position of an allele within a DNA molecule
(c) Regions of chromosomes
(d) Close regions of same chromosomes

(8) The region of the chromosome or more specifically, a length of the DNA molecule, which has a particular nucleotides sequence that codes for specific protein, is called _____ (UHS 2018)

(a) Locus **(b)** Allele
(c) Gene **(d)** Kinetochore

(9) _____ is the exact position of a gene on the chromosome. (UHS 2018)

(a) Genotype **(b)** Centromere
(c) Locus **(d)** Trait

(10) Homozygous means: (UHS 2019)

(a) Having two identical alleles of a gene **(b)** Alleles in an organism
(c) Having two identical genes **(d)** Two different alleles of a gene
(d) 100%

(11) In genetics, the term locus refers to the _____ of the gene on the chromosome. (UHS 2019)

(a) Frequency **(b) Position**
(c) Copy **(d)** Inversion

MENDEL'S LAWS OF INHERITANCE

KIPS MCQs

(12) What will be ratio of two alleles (R & r) in a population having the phenotypic expression as 3:1?

(a) 3:1 **(b)** 2:1
(c) 1:1 **(d)** 1:3

(13) Mendel studied _____ different traits of pea plant.

(a) 14 **(b) 7**
(c) 24 **(d)** 2

(14) A true breeding variety upon self-fertilization always produces:

(a) Only dominant offspring **(b)** Only recessive offspring
(c) Both with ratio 3:1 **(d) Offspring identical to the parents**

(15) The individuals of F1 generation are:

(a) Pure breeding **(b)** Hybrid
(c) Both dominant and recessive with ratio 3:1 **(d) Hybrid and dominant only**

(16) F2 generation of a monohybrid cross yields the offspring in genotype ratio of:

(a) 3 : 1 **(b) 1 :2 : 1**
(c) 1 : 1 **(d)** 9 : 3 : 3 : 1

(17) Point out the recessive trait in garden pea plant from the following options:

(a) Axial Position **(b) Green seed**
(c) Green pod **(d)** Yellow Seed

(18) A pea plant producing four types of gametes must have the genotype as:

(a) RRYY **(b)** RrYY
(c) rrYy **(d) RrYy**

(19) Test cross is used to check the _____ of an individual:

(a) Genotype **(b)** Phenotype
(c) Multiple alleles **(d)** Co dominance

(20) If the result of test cross is 50% or 1:1, the dominant individual should be:

(a) Homozygous **(b) Heterozygous**
(c) Homozygous recessive **(d)** Incompletely dominant

(21) The number of phenotype combinations in F2 generation of dihybrid cross are:

(a) 2 **(b)** 4
(c) 6 **(d) 16**

(22) What term was used for genes/alleles by Mendel?

(a) Genetic factor **(b)** Particulate Hereditary factors
(c) Elementen **(d)** Gene

(23) Name biologist who renamed the elementon as gene:

(a) Mendel **(b)** Morgan
(c) Johannsen **(d)** W.S. Sutton

(24) Segregation of co-existing alleles for each trait in an individual occurs during:
(a) Mitosis **(b) Meiosis**
(c) Both a & b **(d)** None of these

(25) Point out the cross that has 1:1 Phenotypic ratio in Pea plant:
(a) RR × rr **(b)** Rr × rr
(c) Rr × Rr **(d)** RR × RR

(26) The true breeding organism for a particular trait is called:
(a) Homozygous **(b)** Heterozygous
(c) Hybrid **(d)** Monohybrid

(27) Scientists who has/have rediscovered the work of Mendel:
(a) Correns **(b)** De-Varies
(c) Tschermach **(d) All of the above**

PAST PAPERS MCQs

(28) Which one of the following genotypic ratio is observed for cross between heterozygous round and homozygous wrinkled seed is pea: (BWP 2022)
(a) 3:1 **(b)** 1:1
(c) 2:1 **(d)** 1:3

ENTRY TEST BASED MCQs

(29) Self-fertilization of F_1 dihybrids, following independent assortment of alleles will result in: (UHS 2017)
(a) 3/16 tall, round: 3/16 dwarf, wrinkled
(c) 9/16 tall, wrinkled: 3/16dwarf, round
(b) 9/16 tall, round: 1/16 3/16dwarf, round
(d) 3/16 tall, wrinkled: 3/16 dwarf, round

(30) As a result of cross-fertilization of true breeding pea plant having purple colored flowers with that of white colored flowers, the offsprings will have flower with: (UHS 2017)
(a) ¼ purple and ¾ white **(b)** All white
(c) ¼ white and ¾ purple **(d) All purple**

(31) Pure breeding lines of Pea were taken regarding seed shape – Round and Wrinkled and were crossed with no intermediate between parents. All offsprings were found to be round. These results show: (UHS 2017)
(a) Co-dominance
(c) Dominant – recessive relationship of alleles
(b) Incomplete dominance
(d) Over dominance relationship

DOMINANCE RELATION

KIPS MCQs

(32) When heterozygote exceed the phenotypic expression of both the homozygotes the phenomenon is called:
(a) Dominance **(b)** Incomplete dominance
(c) Over dominance **(d)** Co dominance

PAST PAPERS MCQS

(33) Different alleles of a gene that are both expressed in a hterozygous condition are called: (DGK 2015)
(a) Co-dominance **(b)** Dominance
(c) Over-dominance **(d)** Incomplete dominance

(34) The type of inheritance with same phenotypic and genotypic ratio, in F2: (MTN 2019)
(a) Dominance **(c)** Incomplete dominance
(b) Epistasis **(d)** Co-dominance

(35) A single gene with multiple phenotypic effect is describe as: (FSD 2019)
(a) Co-dominance **(b)** Epistasis
(c) Pleiotropy **(d)** Gene linkage

(36) When both the alleles express independently in heterozygous and form their respective products X and Y such type of dominance is called: (MTN 2022)
(a) Partial dominance **(c)** Incomplete dominance
(b) Codominance **(d)** Complete dominance

PREVIOUS YEARS BASED MCQs

(37) Different alleles of a gene that are both expressed in a heterozygous condition are called: (UHS 2017-Retake)
(a) Complete dominance **(b) Co-dominance**
(c) Incomplete dominance **(d)** Over-dominance

(38) When two or more alleles do not show complete dominance or both the alleles are expressing independently in heterozygotic condition. Such a condition is called: (UHS 2018)
(a) Complete dominance **(b) Co-dominance**
(c) Over-dominance **(d)** Incomplete dominance

(39) Blood group AB is an example of _____. (UHS 2019)
(a) Complete dominance **(b)** Incomplete dominance
(c) Co-dominance **(d)** Recessive alleles

MULTIPLE ALLELE

KIPS MCQs

(40) Which fact is not true for a genotype, I^AI^B?
(a) Homozygus **(b)** Hemizygous
(c) Heterezygous **(d) Both a & b**

(41) Which is the universal blood recipient?
(a) AB **(b)** A
(c) B **(d)** O

(42) ABO blood group system was discovered by:
(a) Bernstein **(b) Landsteiner**
(c) Karl Correns **(d)** Johannsen

(43) Gene for the production of antigen A and B is located on chromosome:
(a) 9 **(b)** 19
(c) 11 **(d)** 7

(44) The blood group which is considered as universal donor is:
(a) AB negative **(b)** O positive
(c) O negative **(d)** A negative

(45) If homozygous Rh +ve woman marries with Rh –ve man then what would be the risk of erythroblastosis foetalis in their children:
(a) 50% **(b) 100%**
(c) 25% **(d)** 0%

(46) Baby born alive with erythroblastosis foetalis may suffer from sever anaemia and _____.
(a) Leucemia **(b)** Thalassaemia
(c) Oedema **(d) Jaundice**

(47) No antigen is present in a person with blood group:
(a) AB **(b)** A
(c) B **(d) O**

(48) The possible blood groups of children of parents with A and AB blood group:
(a) A, B, AB and O **(b)** A and B only
(c) A, B, and AB **(d)** A, B and C

(49) A woman of blood A marries a man of blood group O. There are three children in the family. The children's blood types are O, A and AB. Which child was definitely adopted?
(a) Blood type O **(b)** Blood type A
(c) Blood AB **(d)** None of these

PAST PAPERS MCQs

(50) ABO blood group system was discovered by: (SWL 2017, DGK 2018)
(a) Landsteiner **(b)** Levine
(c) Bernstein **(d)** Waldayer

(51) The individual called universal recipient has: (LHR 2017)
(a) B-blood group **(b)** O-blood group
(c) AB-blood group **(d)** A-blood group

(52) All the alternative forms of a gene, whose number is more than two are called: (LHR 2017)
(a) Polygene **(b) Multiple alleles**
(c) Manifold alleles **(d)** Allomorphs

(53) Universal recipient blood group is _____ blood group. (MTN 2018)
(a) A **(b)** B
(c) AB **(d)** O

(54) MN blood type is an example of: (MTN 2021)
(a) Codominance **(b)** Over dominance
(c) Incomplete dominance **(d)** Complete dominance

(55) Maternal Foetal Incompatibility can result due to marriage between: (BWP 2021)
(a) Rh^+ male and Rh^- female **(b)** Rh^- male and Rh^+ female
(b) Rh^+ male and Rh^+ female **(d)** Rh^- male and Rh^- female

ENTRY TEST BASED MCQs

(56) Which one of the following is multiple allelic character? (UHS 2018)
(a) Length of stem in pea plant **(b) Blood group of the human being**
(c) Shape of seed in pea plant **(d)** Colour of flower in pea plant

EPISTASIS, PLEIOTROPY, CONTINUOUSLY VARYING TRAIT

KIPS MCQs

(57) A gene with multiple phenotypic effects is called:
(a) Polygene **(b) Pleotropic gene**
(c) Polymorphic gene **(d)** Epistatic gene

(58) Example of continuously varying trait in human is:
(a) Tongue rolling **(b)** Blood group
(c) Ear lobe **(d) Skin colour**

(59) The interaction between different genes occupying different loci is called:
(a) Epistasis **(b)** Pleiotropy
(c) Dominance **(d)** Multiple alleles

(60) H gene for the insertion of sugar onto glycoprotein on the surface of RBC is located on chromosome:
(a) 9 **(b) 19**
(c) 11 **(d)** 7

(61) What would be phenotype of a person with genotype I^AI^B, hh, dd?
(a) O –ve **(b)** AB +ve
(c) AB –ve **(d)** O +ve

(62) The gene for white eyes in *Drosophila* also affects:
(a) Deafness **(b) Shape of spermathecae**
(c) Shape of wings **(d)** Size of sex comb in male

(63) Human skin colour is controlled by:
(a) 2 – 4 gene pairs **(b)** 3 gene pairs
(c) 3 – 5 gene pairs **(d) 3 – 6 gene pairs**

(64) Discontinuous variations show:
(a) Symmetric distribution curve **(b) Asymmetric distribution curve**
(c) Polygenic inheritance **(d)** Several intermediate phenotypes

(65) If in a wheat plant there are two dominant alleles for grain colour then the grain colour would be:
(a) Light pink **(b)** White
(c) Light red **(d) Pink**

PAST PAPERS MCQs

(66) How many gene pairs contribute to the wheat grain colour? (MTN 2017)
(a) One **(b)** Two
(c) Three **(d)** Four

(67) Bombay phenotype is an example of: (BWP 2018)
(a) Pleiotropy **(b)** Dominance
(c) Probability **(d) Epistasis**

(68) A gene with multiple phenotypic effect is called: (LHR 2018, FSD 2018)
(a) Polygenic **(b)** Multiple allele
(c) Epistatic **(d) Pleiotropic**

(69) Human skin color is a quantitative trate which is controlled by pairs of genes: (DGK 2018)
(a) 5-8 **(b)** 4-8
(c) 3-6 **(d)** 4-7

GENE LINKAGE, CROSSING OVER

KIPS MCQs

(70) Gene linkage is:
(a) Physical relation **(b)** Physiological relation
(c) Both of these **(d)** None of these

(71) Which of the following trait is not X linked?
(a) Colour blindness **(b)** Gout
(c) Haemophilia **(d) Leukemia**

(72) Crossing over is exchange of chromosomal segments between:
(a) Non sister chromatids of homologous chromosomes
(b) Sister chromatids
(c) Non sister chromatids of non homologous chromosomes
(d) Any of the above combination

(73) Which is not true about linked gene?
(a) They reduce the chance of variation
(b) They are physical linked
(c) They may show independent assortment
(d) Linkage groups correspond to number of homologous pairs

(74) Which phenomenon provides the raw material for evolution?
(a) Independent assortment **(b)** Crossing over
(c) Gene linkage **(d) Both a and b**

(75) Which phenomenon reduces the chances of genetic recombination and variations among offspring?
(a) Linkage **(b)** Crossing-over
(c) Dominance **(d)** Independent Assortment

PAST PAPERS MCQs

(76) If there is 40% recombination frequency between two genes, then distance between then in unit map is: (LHR 2019)
(a) 30 **(b)** 40
(c) 50 **(d)** 60

(77) Chances of genetic recombination are minimized due to: (RWP 2021)
(a) Crossing over **(b)** Independent assortment of chromosomes
(c) Mutation **(d) Gene linkage**

ENTRY TEST BASED MCQs

(78) There are_____ number of linkage groups in human. (UHS 2018)
(a) 22 **(b)** 46
(c) 23 **(d)** 80

(79) Chance of a cross over between two loci is directly proportional to their: (UHS 2018)
(a) Length **(b)** Width
(c) Distance **(d)** Thickness

SEX DETERMINATION

KIPS MCQs

(80) All chromosomes other than sex chromosomes are called:
(a) Karyotype **(b) Autosomes**
(c) Pseudoautosomes **(d)** Both b and c

(81) Sex chromosomes were discovered by:
(a) Morgan **(b)** Bridges
(c) Karl Correns **(d)** De Varies

(82) Sex chromosomes XY present in females of:
(a) Humans **(b) Butterflies**
(c) *Drosophila* **(d)** Grass hopper

(83) Number of chromosome in male *Ascaris incurva* is:
(a) 13 **(b)** 26
(c) 36 **(d)** 42

(84) XO condition in *Drosophila* produces:
(a) Sterile male **(b)** Fertile female
(c) Sterile female **(d)** Fertile male

(85) In *Drosophila* male determining genes are located on:
(a) X chromosome **(b)** Y chromosome
(c) Autosomes **(d)** Both on X and Y chromosomes

(86) SRY is located at:
(a) Long arm of Y chromosome **(b) Short arm of Y chromosome**
(c) X chromosome **(d)** Both arms of Y chromosome

(87) Nullo gametes are present in:
(a) Humans **(b)** Butterfly
(c) *Drosophila* **(d) Grass hopper**

(88) Point out the one that has genic system for determination of sex:
(a) Yeast **(b)** Fruit fly
(c) Cockroach **(d)** Ginkgo

(89) In *Ascari incurva*, compound X chromosome is present, how many X chromosomes collectively form one unit of compound X:
(a) 16 **(b)** 26
(c) 8 **(d)** 4

PAST PAPERS MCQs

(90) A gamete without any sex chromosome is called: (GRW 2019)
(a) Heterogamete **(b)** Nullo gamete
(c) Nill gamete **(d)** Homogamete

(91) Which traits are more common in male humans? (SGD 2021)
(a) X-linked dominant **(b)** X-linked recessive
(c) sex limited **(d)** Sex influenced

SEX LINKAGE IN DROSOPHILA

KIPS MCQs

(92) Morgan and his colleagues studied more than _____ traits in *Drosophila*.
(a) 85 **(b)** 90
(c) 60 **(d)** 8

(93) In what part of *Drosophila*, the cells have the giant chromosomes?
(a) Ovary **(b)** Intestine
(b) Intestinal caecae **(d)** Salivary gland

SEX LINKAGE IN HUMANS

KIPS MCQs

(94) Which one of the traits zigzags from maternal grand father through a carrier daughter to a grandson?
(a) Autosomal **(b) X-linked**
(c) Y-linked **(d)** X & Y-linked

(95) The gene for blue opsins is located on:
(a) Chromosome 7 **(b)** Chromosome 11
(c) X chromosome **(d)** Chromosome 19

(96) Pseudoautosomal genes are located on:
(a) Autosomes **(b)** X chromosome
(c) Y chromosome **(d) Both X and Y chromosomes**

(97) Which of the protein is light absorbing?
(a) Actin **(b)** Tropomyosin
(c) Opsin **(d)** Myosin

(98) The red blindness in man is called:
(a) Tritanopia **(b) Protanopia**
(c) Deuteranopia **(d)** None of these

(99) The difference in sex influenced trait in expression is due to:
(a) Anatomical differences **(b) Hormonal differences**
(c) Chromosomal differences **(d)** Enzymatic differences

(100) X linked dominant traits are:
(a) More common in females than males **(b)** More common in males than females
(c) Equal in both sexes **(d)** Present only in females

(101) A colour blind man marries with a normal woman whose father was colour blind. What proportion of their children can have normal colour vision?
(a) 3:1 **(b) 1:1**
(c) 1:3 **(d)** All males colour blind.

(102) Normal colour vision is:
(a) Trichromacy **(b)** Monochromacy
(c) Dichromacy **(d)** Anopia

(103) The gene for red and green opsins are located on:
(a) Chromosome 7 **(b)** Chromosome 11
(c) X chromosome **(d)** Chromosome 19

(104) Which type of haemophilia is an autosomal recessive trait:
(a) A **(b)** B
(c) C **(d)** Both B and C

(105) Which of the following gene is Y-linked in inheritance?
(a) SRY **(b)** tfm
(c) Hypophosphatemic rickets **(d)** Colour Blindness

(106) Which one of the following character is a sex limited trait in man?
(a) Beard growth **(b)** Height
(c) Weight **(d)** Diabetes

PAST PAPERS MCQs

(107) Deutranopia is a color blindness of: **(RWP 2017)**
(a) Red **(b)** Blue
(c) Green **(d)** Yellow

(108) Hypophosphatemic rickets is an X-linked: **(FSD 2017)**
(a) Dominant trait **(b)** Recessive trait
(c) Codominant trait **(d)** Over dominant trait

(109) The true colour blindness is: **(DGK 2017)**
(a) Monochromacy **(b)** Dichromacy
(c) Trichromacy **(d)** Tetrachromacy

(110) The gene for blue opsin is present on autosome: **(BWL 2017)**
(a) 7 **(b)** 11
(c) 19 **(d)** 21

(111) About 20% suffer from hemophilia B due to disturbance in factor **(MTN 2017)**
(a) IX **(b)** X
(c) XI **(d)** XII

(112) Protanopia is a: **(MTN 2018)**
(a) Red blindness **(b)** Green blindness
(c) Blue blindness **(d)** Brown blindness

(113) Secretors have dominant secretor gene "Se" on chromosome: **(SWL 2018)**
(a) 9 **(b) 19**
(c) 21 **(d)** 24

(114) Hypopdosphaemic tickets is an X-linked: **(LHR 2019)**
(a) Dominant trait **(b)** Co-dominant trait
(b) Over-dominant trait **(d)** Recessive trait

(115) Which traits are more common in male humans? (SGD 2019)
(a) X-linked dominant **(b)** X-linked recessive
(c) sex limited **(d)** Sex influenced

(116) A rate X-linked recessive trait is: (SGD 2022)
(a) Down's syndrome **(b)** Testicular feminization
(c) Tuner; 'Syndrome **(d)** All A,B and C

ENTRY TEST BASED MCQs

(117) A person was married to his cousin and both are heterozygous for sickle cell anemia. Among their four kids, what will be proportion of affected homozygotes? (UHS 2019)
(a) 50% **(b)** 75%
(c) 25% **(d)** 100%

(118) The gene for red-green color blindness is present on: (UHS 2017)
(a) Y–chromosome **(b)** Autosome No. 7
(c) X–chromosome **(d)** Autosome No.9

(119) In which situation, genes are not assorted independently during meiosis in a chromosome? (UHS 2019)
(a) When genes are not linked and their loci are far apart
(c) When there are too many genes on a chromosome
(b) When some genes have mutated on the chromosome
(d) When genes are linked and their loci are close to each other

(120) If a carrier haemophilic female (X^HX^h) is married to a haemophilic male (X^hY). What will be the ratio of presence of haemophilia in the children? Select best answer from given condition. (UHS 2019)

$$X^HX^hX^hY$$

(a) 100% all females and males will be haempohlic
(b) Carrier female 25% haemophilic female 25%, 25% normal male and 25% haemophilic male
(c) Females and males both have 50% chances to getting haemophilia
(d) Females have 50% chances of getting haemophilia and females will be 100% haemophilic.

DIABETES MELLITUS AND ITS GENETIC BASIS

KIPS MCQs

(121) _____ diabetes mellitus is insulin dependent.
(a) Type I **(b)** Type II
(c) Both of these **(d)** None of these

PAST PAPERS MCQs

(122) The maturity onset diabetes of the young is: (RWP 2017, RWP 2019)
(a) An autosomal dominant trait **(b)** An autosomal recessive trait
(c) A sex linked trait **(d)** A sex impulse trait

(123) What is the risk of a colour blind in a family, when father is colour blind but mother is normal? (DGK 2022)
(a) 0% **(b)** 25%
(c) 50% **(d)** 100%

ANSWER KEY

(Topic Wise Multiple Choice Questions)

1	d	21	d	41	a	61	a	81	a	101	a	121	a
2	c	22	c	42	b	62	b	82	b	102	a	122	a
3	c	23	c	43	a	63	d	83	c	103	c	123	
4	b	24	b	44	c	64	b	84	a	104	c		
5	b	25	c	45	b	65	d	85	c	105	a		
6	c	26	a	46	d	66	c	86	b	106	a		
7	a	27	d	47	d	67	d	87	d	107	c		
8	c	28		48	c	68	d	88	a	108	a		
9	c	29	d	49	c	69	c	89	c	109	a		
10	a	30	d	50	a	70	a	90		110			
11	b	31	c	51	c	71	d	91		111	a		
12	c	32	c	52	b	72	a	92	a	112	a		
13		33	a	53	c	73	c	93		113	b		
14	d	34		54		74	d	94	b	114			
15	d	35		55	b	75	a	95	a	115			
16	b	36		56	b	76		96	d	116			
17	b	37	b	57	b	77	d	97	c	117	c		
18	d	38	b	58	d	78	c	98	b	118	c		
19	a	39	c	59	a	79	c	99	b	119	d		
20	b	40	d	60	b	80	b	100	a	120	b		

GENE, GENE POOL

KIPS SHORT QUESTIONS

Q:1 Which can determine the specificity of a specific gene?

Ans: The specificity of a gene is determined by the particular sequence of nucleotide or bases. As the genetic codes are actually particular arrangements of nucleotides.

Q:2 "Phenotype is a translation of Genotype". Comment on it.

Ans: Phenotype is actually the physical appearance of particular arrangement of alleles for a trait. As phenotype is representation of genetic complement so it may be called as the translation of genotype.

PAST PAPERS QUESTIONS

Q:3 How genotype differs from phenotype? **(GRW 2017)**

Q:4 Differentiate between gene and allele. **(RWP 2017)**

Q:5 What is a test cross? Who devised it? **(RWP 2018)**

Q:6 What do you know about gene and locus? **(RWP 2019)**

Q:7 Differentiate genotype from phenotype. **(SGD 2019)**

Q:8 What is gene and its locus? **(LHR 2021)**

Q:9 Write dominant and recessive trait. **(LHR 2021)**

Q:10 Define Jumping Genes. **(MTN 2019. MTN 2021)**

Q:11 What is allele and gene? **(SGD 2017, MTN 2018, *LHR 2019*)**

Q:12 Differentiate between homozygous and heterozygous. **(SGD 2017, BWP 2021, BWP 2022)**

Q:13 Differentiate between dominant and recessive traits. **(DGK 2022)**

Q:14 Differentiate between phenotype and genotype.

(MTN 2017, RWP 2017, 2018, SWL 2019, FSD 2021, GRW 2022, RWP 2022)

MENDEL'S LAWS OF INHERITANCE

KIPS SHORT QUESTIONS

Q:15 Does segregation occur in asexual reproduction?

Q:16 Ans: No, as the asexual reproduction involves only mitotic division and segregation of alleles occur only at the time of meiosis. **What would have happened if Mendel had studied an eight character in pea plant?**

Ans: Pea plant has seven chromosome and all the traits selected by Mendel, was located on non homologous chromosome that is necessary for the independent assortment of alleles. If he had studied an eight character, that would be linked to any of the other trait so independent assortment would not be possible.

Q:17 Does the dominant allele modify the determinative nature of its recessive partner?

Ans: In heterozygous condition the dominant allele completely mask the expression of recessive one but the blending at genetics does not occur neither it alters its determinative nature. When recessive alleles segregate it may express its phenotype by random fertilization.

Q:18 What would happen if alleles of a pair do not segregate at meiosis? How would it affect the purity of gametes?

Ans: If alleles of a pair do not segregate then recessive allele would be unable to express its phenotype. In this condition both kind of alleles would be present in the same gamete while the second gamete will contain no allele.

Q:19 Why there is no need of test cross in case of incomplete or co-dominance?

Ans: As test cross is used to check either the dominant individual is homozygous or heterozygous. In case of incomplete or co-dominance the heterozygous dominant individuals express a separate phenotype that can easily be distinguished

Q:20 Define locus.

Ans: The position of a gene on the chromosome is called its locus.

Q:21 What is the significance of using *Pisum sativum* in genetic experiments? OR how can you say that Mendel was lucky in choosing *Pisum sativum* as experimental plant.

Ans: *Pisum sativum* was easy to cultivate and it grew well in his garden. Its flowers were hermaphrodite. It was normally self – fertilizing, but could also be cross – fertilized. As the time gap between generations was short, Mendel could raise many generations of pea within a short time. Pea had many sharply distinct traits. Each trait had two clear cut alternative forms or varieties; e.g. seed shape had a round or wrinkled phenotype.

Q:22 What would be the result of a cross between heterozygous dominant with a recessive one?

Ans: Offsprings are produced in 1:1 ratio.

Q:23 What is the purpose of test cross?

Ans: It is used to test the genotype of an individual showing a dominant phenotype. This cross finds out the homozygous or heterozygous nature of the genotype.

Q:24 Define probability & Product rule.

Ans: **Probability** is the chance of an event to occur.

Product Rule: In Dihybrid cross, the ratio of each joint phenotypic combination can be obtained by multiplying the probabilities of individual phenotypes. It is called **product rule.**

Q:25 State Mendel's law of segregation.

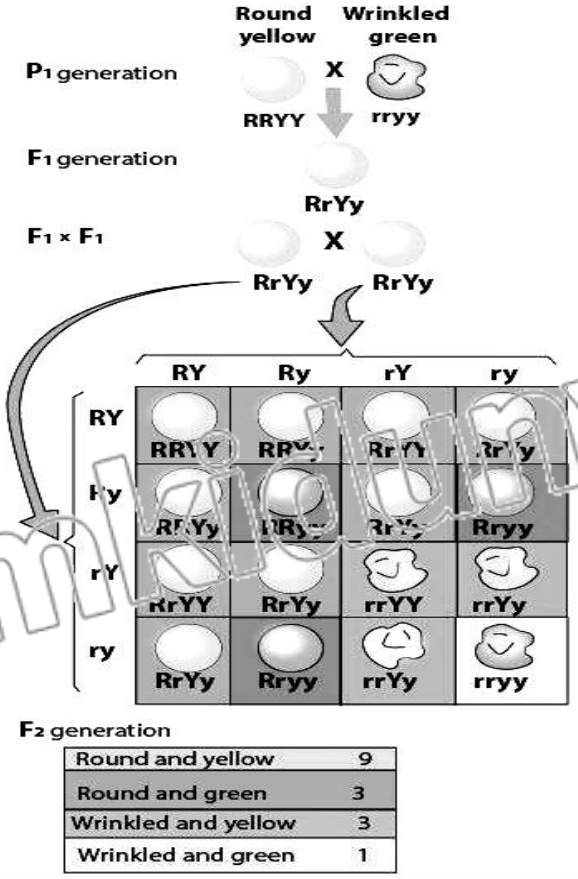
Ans: According to law of segregation, the two coexisting alleles for each trait in an individual segregate (separate) from each other at meiosis, so that each gamete receives only one of the two alleles. Alleles unite again at random fertilization of gametes when zygote is formed.

Q:26 What is elementen?

Ans: That each contrasting forms of a trait, e.g. roundness or wrinkledness of seed was determined by **particulate hereditary factors,** which Mendel called 'elementen'.

Q:27 State Mendel's law of independent assortment.

Ans: When two contrasting pairs of traits are followed in the same cross, their alleles assort independently into gametes.



F2 generation

Round and yellow	9
Round and green	3
Wrinkled and yellow	3
Wrinkled and green	1

PAST PAPERS QUESTIONS

Q:28 Give significance of test cross. **(SWL 2017)**
Q:29 State Mendel's law of independent assortment. **(GRW, LHR 2017)**
Q:30 What is test cross? Give its importance. **(LHR 2017)**
Q:31 Describe the law of independent assortment with an example. **(LHR 2017)**
Q:32 What is probability and product rule? **(GRW 2017)**
Q:33 Define test cross. Explain it with example. **(GRW 2017)**
Q:34 What is law of segregation? **(LHR 2017, GRW 2018)**
Q:35 What is law of segregation? **(FSD 2018)**
Q:36 Give significance of test cross. **(LHR 2018)**
Q:37 Define crossing over. Give its importance. **(MTN 2018)**
Q:38 What is law of segregation? **(MTN 2018)**
Q:39 Give significance of test cross. **(SGD 2017, 2018)**
Q:40 Define law of independent assortment. **(SGD 2018)**
Q:41 Wat is the importance of garden pea (*Pisum sativum*) plant in genetic? **(DGK 2018)**
Q:42 What do you know about monohybrid and dihybrid crosses? **(GRW 2019)**
Q:43 State the law of independent assortment. **(SWL 2019)**
Q:44 What is test cross? **(DGK 2019)**
Q:45 What is law of segregation? **(FSD 2019)**
Q:46 Define Law of segregation. **(RWP 2019)**
Q:47 Write down any four contrasting traits of garden pea studied by G. Mendel. **(MTN 2019)**
Q:48 Define Mendel's law of segregation. **(DGK 2019)**
Q:49 What is dihybrid cross? **(LHR 2021)**
Q:50 Define monohybrids and dihybrids. **(LHR 2021)**
Q:51 Define probability. What is product rule? **(MTN 2021)**
Q:52 What do you understand by independent assortment of alleles? **(FSD 2021)**

DOMINANCE RELATION

KIPS SHORT QUESTIONS

Q:53 Define co-dominance.

Ans: Such type of dominance relation in which both alleles are expressed independently is called co-dominance.

Q:54 Define over dominance with suitable example.

Ans: In over dominant heterozygote exceeds in quantity the phenotypic expression of both homozygotes. In fruit fly *Drosophila* the heterozygote (w^+ / w) has more quantity of fluorescent pigments in eyes than wild (w^+ / w^+) or white eyes (w / w) homozygotes.

Q:55 Give features of incomplete dominance.

Ans: When the phenotype of the heterozygote is intermediate between phenotypes of the two homozygotes, it is called **incomplete or partial dominance**. As there is no truly dominant allele, the usual capital and small letter distinction for dominant and recessive trait is not necessary. There is absolutely no need of a test cross.

PAST PAPERS QUESTIONS

Q:56 Write down few lines about codominance. **(DGK 2017)**
Q:57 Define co-dominance and give an example. **(DGK 2017)**
Q:58 What is codominance? **(SWL 2018)**
Q:59 Differentiate between complete dominance and codominance. **(BWP 2018)**
Q:60 Differentiate between codominance and overdominance. **(RWP 2018)**
Q:61 Define co dominance with an example. **(LHR 2019)**
Q:62 What is Over Dominance? Give an example. **(BWP 2019)**
Q:63 Define and explain codominance. **(SGD 2019)**

Q:64 What is Over-Dominance? **(MTN 2019, MTN 2021, BWP 2021)**
Q:65 What is Complete Dominance? **(BWP 2021)**
Q:66 Write a note on codominance. **(FSD 2021)**
Q:67 Compare codominance with incomplete dominance. **(MTN 2022)**
Q:68 Define over dominance. Give an example. **(BWP 2022)**

MULTIPLE ALLELE

KIPS SHORT QUESTIONS

Q:69 How two parents with blood group A and AB may have a child with O blood group?
Ans: Although O blood group require two recessive alleles but due to epistasis of a gene H on blood group O blood group may appear. This gene is responsible to add attachment site to antigen. Both the parents must be heterozygous for that gene (Hh). Child would be homozygous recessive (hh).

Q:70 Define multiple alleles.
Ans: All altered alternative forms of a gene, whose number is more than two, are called **multiple alleles**.
e.g. In ABO blood group system I^A, I^B, i.

Q:71 Explain the risk of Erythroblastosis foetalis.
Ans: If the man's genotype is DD, all of their offspring (Dd) will be Rh^+. If the man's genotype is Dd, half of their offspring with Dd genotype will be Rh^+. There is always a chance of Erythroblastosis foetalis whenever a Rh^+ Foetus is conceived by the Rh^- mother.

Q:72 What do you mean by agglutination?
Ans: Formation of clump in blood due to the reaction of antibody with compatible antigen.

Q:73 What do you mean by polymorphic gene?
Ans: Gene having more then two allelic forms is called polymorphic gene e.g. 'I' gene for ABO antigen on RBCs has three forms I^A, I^B and i.

PAST PAPERS QUESTIONS

Q:74 Why is blood group AB called as universal recipient? **(FSD 2017)**
Q:75 What are multiple alleles? Give example. **(MTN 2017, BWP 2017, FSD 2018)**
Q:76 What is Rh blood group system? Who 1st discovered its antigen? **(SWL 2018)**
Q:77 An **Rh^-** Woman is married to an **Rh^+** man whose father was also **Rh^-**. What is the probable risk of Erythroblastosis Foetalis in their babies? **(BWP 2019)**
Q:78 What is Erythroblastosis foetalis? How it is treated after birth? **(SWL 2021)**
Q:79 What is a universal blood donor? **(FSD 2019, FSD 2021)**
Q:80 Differentiate between alleles and multiple alleles. **(FSD 2021)**
Q:81 How can you protect the baby against Rh – incomparability? **(MTN 2022)**

EPISTASIS, PLEIOTROPY, CONTINUOUSLY VARYING TRAIT

KIPS SHORT QUESTIONS

Q:82 What are polygenic traits?
Ans: A continuously varying trait is encoded by alleles of two or more different gene pairs found at different loci, all influencing the trait in an additive way, are called polygenic traits and their genes are "polygenes".
e.g. Weight, height, intelligence.

Q:83 Compare between epistasis and pleiotropy.
Ans:

Epistasis	Pleiotropy
When a gene or gene pair at one locus interferes with or hides the effect caused by another gene or gene pair at another locus, such as phenomenon of gene interaction is called epistasis.	When a single gene affects two or more traits, the phenomenon is called pleiotropy.
e.g. Bombay phenotype.	e.g. White eye gene in *Drosophila* also affects the shape of sperms storing organs.

PAST PAPERS QUESTIONS

Q:84 Define epistasis. Give example. **(SWL 2017, DGK 2017, RWP 2017, MTN 2018,)**
Q:85 Differentiate between quantitative variation and qualitative variation. **(FSD 2017)**
Q:86 Define epistasis and pleiotropy. **(MTN 2017)**
Q:87 What is pleiotropy? Give its example. **(BWP 2018)**
Q:88 What is epistasis? Differentiate it from dominance. **(MTN 2018)**
Q:89 What is epistasis? How it differs from dominance? **(LHR 2018)**
Q:90 What is Bombay phenotype? **(SWL 2018)**
Q:91 Define epistasis. **(LHR 2018, DGK 2019)**
Q:92 What do you know about "Epistatsis"? **(GRW 2019)**
Q:93 What are polygenic traits? Give an example. **(DGK 2019, RWP 2021)**
Q:94 Define Pleiotropy with an example. **(DGK 2019, DGK 2022)**
Q:95 Differentiate qualitative traits from quantitative traits. **(MTN 2019, BWP 2022)**

GENE LINKAGE, CROSSING OVER

KIPS SHORT QUESTIONS

Q:96 What is the difference between Heterogametic and Homogametic individuals?
Ans:

Homogametic	Heterogametic
Individual having both same types of sex chromosomes.	Individual having both different types of chromosomes.
They produce all gametes of same type.	They produce two types of gametes.
Human females (XX), butterfly males (ZZ)	Human males (XY), butterfly females (ZW)

Q:97 Give the comparison of chromosomal determination of sex between *Drosophila* and Humans have XO and XXY sex chromosomes.
Ans: Similarities:

- Both have XY – XX pattern of determination.
- In both types male is heterogametic and females homogametic.

Differences:

Humans	*Drosophila*
Male determining genes are located on Y chromosome.	Male determining genes are located on autosomes.
No X chromosome – autosome balance is present.	Sex determination is actually due to X chromosome – autosome balance.
In abnormal condition XO is sterile female disorder while XXY is sterile male.	In abnormal condition XO is sterile male while XXY is sterile female.

Q:98 What is SRY gene?
Ans: SRY is the male determining gene. SRY stands for Sex determining regions of Y." It is located at the tip of short arm of Y-chromosome.
Q:99 Differentiate between homozygous and hemizygous.
Ans:

Homozygous	Hemizygous
When both the alleles of a gene pair in an organism are same, it is called homozygous.	The organism which carries just one allele on their only X chromosome and Y chromosome is empty for genes is called hemizygous.
e.g. $X^{W+}X^{W+}$ in *Drosophila* females.	e.g. *Drosophila* males are hemizygous for eye color gene.

Q:100 Define crossing over. How recombination frequency can be calculated.
Ans: Crossing over is an exchange of segments between non–sister chromatids of homologous chromosomes during meiosis.
Recombination Frequency
It is the proportion of recombinant types between two gene pairs as compared to the sum of all combinations.

$$\text{Recombination Frequency} = \frac{\text{Recombinant types}}{\text{Sum of all combinations}} \times 100$$

Q:101 Define gene linkage.

Ans: The phenomenon of staying together of all the genes of a chromosome is called **linkage**. Gene linkage is a physical relationship between genes.
e.g. Genes for color blindness, hemophilia, gout form one linkage group on X–chromosome.

Q:102 Give the kind of observation that would lead you to suspect that a certain human character was controlled by polygene

Ans: Polygenic traits exhibit continuous quantitative variation over a range of many phenotypes between two extremes. There are several characters in humans showing the same pattern such as height, skin colour, intelligence etc. The phenotypes of these traits variable even among the offspring of same parents

Q:103 . Name the traits which are linked to chromosome no. 11 and X chromosome in human.

Ans: Genes for colour blindness, haemophilia, gout etc form one linkage group on human X-chromosome. Similarly, gene for sickle cell anaemia, leukemia and albinism make another linkage group on human chromosome 11.

PAST PAPERS QUESTIONS

Q:104 Define gene linkage and gene linkage groups. **(RWP 2017, LHR 2018)**
Q:105 Differentiate between gene linkage and crossing over. **(SWL 2018, RWP 2021, SWL 2021)**
Q:106 Differentiate between linkage and linkage group. **(DGK 2018)**
Q:107 Define linkae. Enlist linkage groups of chromosomes no. 11 and 23. **(LHR 2021)**
Q:108 Define linkage and give its one disadvantage. **(RWP 2019, SGD 2021)**
Q:109 Why is crossing over so important? **(DGK 2022)**
Q:110 Which type of genes do not obey law of independent assortment? **(MTN 2022)**
Q:111 What is gene linkage and linkage group? **(SGD 2022)**

SEX DETERMINATION

PAST PAPERS QUESTIONS

Q:112 What is ZW–ZZ mechanism of sex determination? **(MTN 2017)**
Q:113 Write down testicular feminization syndrome. **(DGK 2017)**
Q:114 How sex determination occurs in yeast? **(LHR 2017)**
Q:115 What is heterogametic individual? Give example. **(LHR 2018)**
Q:116 How sex is determined in plants? **(DGK 2018)**
Q:117 Differentiate autosomes and sex chromosomes. **(LHR 2019)**
Q:118 What are the compound sex chromosome? Give an example. **(MTN 2019)**
Q:119 Describe XO – XX type of sex determination. **(MTN 2019)**
Q:120 What is a genic system for determination of sex? **(DGK 2019)**
Q:121 Differentiate between autosomes and sex chromosomes. **(LHR 2017, GRW 2018, MTN 2021)**
Q:122 What are pseudoautosmal genes? Give an example. **(SGD 2022)**

SEX LINKAGE IN DROSOPHILA

KIPS SHORT QUESTIONS

Q:123 What do you mean by sexual dimorphism? Explain this phenomenon in *Drosophila*.

Ans: Sexual dimorphism is features in which male & females are morphologically distinct form each other. Male is smaller in size with black rounded abdomen. Female is larger with pointed abdomen. Male has sex combs on front legs.

Q:124 What do you mean by pseudoautosomal trait?

Ans: Some genes like bobbed gene in *Drosophila* are present on X and Y both. These are called **X – and – Y linked genes.** These are also called **pseudoautosomal genes** because their pattern of inheritance is like autosomal genes.

Q:125 Define generation time. What is the generation time in *Drosophila*?

Ans: The period required for animal to become capable of reproduction is called generation time. *Drosophila* has a generation time of just two weeks.

Q:126 Define sex limited traits.

Ans: A sex – limited trait is limited to only one sex due to anatomical differences e.g. genes for milk yield in dairy cattle affect only cows.

PAST PAPERS QUESTIONS

Q:127 Explain karyotype of *Drosophila*. **(DGK 2018)**

Q:128 State sexual dimorphism in drosophila. **(LHR 2022)**

SEX LINKAGE IN HUMANS

KIPS SHORT QUESTIONS

Q:129 Why haemophilia and colour blindness (X–linked recessive traits) are more in males than females?

Ans: Haemophilia and colour blindness are X–linked recessive trait. As males have only one X chromosome so one recessive allele is enough to express. But in females there must be at least two recessive alleles for the appearance of trait, so females have less chance for these disorders.

Q:130 Can two normal parents have a colour-blind child? Explain.

Ans: Yes, two normal parents may have colour-blind child. When mother is normal carrier (X^CX^c) and father is normal (X^CY) then there is possibility to have a colour blind son only.

Q:131 Why males in case of haemophilia and colour blindness are called hemizygous?

Ans: The genes for both haemophilia and colour blindness are located only on X chromosomes and Y chromosome is neutral for both. As males have only one X chromosome so in male only one gene is present at a time, which represents half of his gametes. So males are hemizygous for these traits.

Q:132 What do you mean by sex influenced traits?

Ans: Sex influenced trait occurs in both males and females but it is more common in one sex. It is controlled by an allele that is expressed as dominant in one sex but recessive in the other. This is due to hormonal difference between the sexes. Pattern baldness is a sex influenced trait.

Q:133 What are jumping genes?

Ans: Jumping genes are genes which do not settle peacefully on their loci, they keep on hopping on different loci on the same chromosome or other chromosomes.

PAST PAPERS QUESTIONS:

Q:134 What are sex influenced traits? Give an example. **(LHR 2017)**

Q:135 Differentiate between sex limited and sex influenced trait. **(MTN 2017)**

Q:136 What do you know about Hypophosphatemic rickets? **(RWP 2017)**

Q:137 What is the sex–limited trait? Give an example. **(LHR 2018)**

Q:138 Differentiate between X-linked dominant and X-linked recessive traits. **(LHR 2021)**

Q:139 What is hemophilia? Name its types. **(MTN 2021)**

Q:140 Enlist types of colourblindness. **(MTN 2021)**

Q:141 What are sex linked recessive traits? Why men are more vulnerable than women? **(SWL 2021)**

Q:142 Differentiate between what is sex-limited trait? **(LHR 2022)**

Q:143 Give example and illustrate sex-limited trait. **(GRW 2022, RWP 2022)**

DIABETES MELLITUS AND ITS GENETIC BASIS

KIPS SHORT QUESTIONS

Q:144 What do you mean by Juvenile diabetes?

Ans: Type I is also called Juvenile diabetes because it usually occurs in early age before 40. It arises due to deficiency of pancreatic hormone insulin also called insulin dependent diabetes mellitus.

Cause: In this diabetes body immune system, manufacture antibodies against body's own pancreatic β–cells.

PAST PAPERS QUESTIONS

Q:145 What is MODY? How it is inherited? **(FSD 2017, FSD 2017, DGK 2018)**

Q:146 What is hemophilia? Give its different types. **(GRW 2018)**

Q:147 How is blood pressure a multifactorial trait? **(DGK 2017)**

Q:148 What is diabetes? Name its types. **(SWL 2019)**

Q:149 Differentiate between diabetes mellitus type – I and diabetes melliatna type – II. **(GRW 2022)**

Q:150 Differentiate between diabetes mollies type-1 and diabetes mellitus type-II. **(RWP 2022)**

Q:151 Why blood pressure is a multination trait? **(SGD 2022)**