EXERCISE-3
Gene interaction, Pleiotropic gene, Lethal gene, Sex linkage, Polygenic inheritance, Monoclonal antibody

1. Epistasis was discovered by :-
(l)Johanson (2) Shull
(3) Bateson (4) Mendel

2. The ratio of recessive epistasis is :-
(1) 9 : 3 : 4 (2) 13 : 3
(3) 12:3 :1 (4) 15 : 1

3. A normal woman whose father was albino, marries an albino man, what proportion of normal and albino are expected among their offsprings :-
(1) All normal
(3) All albino
(2) 2 normal : 1 Albino
(4) 1 normal: 1 Albino

4. What is the inheritance of colour blindness of both parents having a normal vision but mother has a recessive gene for colour blindness **:-**

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

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

6. 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

7. Inheritance of skin colour in human beings is an example of :-
(1) Complementary gene
(2) Monogenic inheritance
(3) Polygenic inheritance
(4) Mendelian inheritance

8. Albinism in corn is due to :-
(1) Pathogenic effect
(2) Deficiency of light
(3) Deficiency of minerals
(4) lethal gene effect

9. A gene which suppresses the effect of another gene not located on the similar locus of the homologous chromosomes:-
(1) Duplicate gene
(2) Complementary gene
(3) Epistatic gene
(4) Supplementary gene

10. 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

11. When two independentaly assorting dominant genes interact with each other to produce perticular phenotype but when they present alone they did not produce phenotype they are called :-
(1) Complementary gene
(2) Supplementary gene
(3) Duplicate gene
(4) Inhibitory gene

12. Polygenic genes show :-
(1) Identical phenotype
(2) Identical biochemistry
(3) Different phenotype
(4) Identical genotype

13. AB - Blood group shows :-
(1) Co-dominance
(2) Complete dominance
(3) Mixed inheritance
(4) Composite inheritance

14. ABO blood group is an example of:-
(1) Epistasis
(2) Multiple allelism

(3) Pleotropism
(4) Complementary genes

15. A child is blood group is 'O'. His parents blood groupcan not be :-
(1) B&O (2) A&O
(3) AB (4) A&B

16. If selfing occurs in the plant having genotype RrYy,then ratio of given genotype will be :- RRYY, RrYY,RRYy, RrYy
(1) 1:2:2:4 (2) 1:2:2:1
(3) 1:1:1:1 (4) 2:2:2:1

17. If one parent has blood group A and the other parent has blood group B. The off springs have which blood group :
(1) AB (2) O
(3) BO (4) A, B, AB, O

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

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

20. Ratio 9:7 is due to :-
(1) Supplementary genes (2) Lethal genes
(3) complementary genes (4) Epistatic genes

21. A man of A blood group marries a woman of AB blood group, which type of progeny would indicate that man is heterozygous A :-
(1) AB (2) A
(3) 0 (4) B

22. A child of O blood group, has B-blood group father, the genotype of father would be :-
(1) IT (2) PP
(3) IAIB (4) IBI°

23. In a dihybrid cross, F2 ratio of 15:1 is due to :-
(1) Supplementary genes (2) Dominant epistasis
(3) Duplicate genes (4) Recessive epistasis

24. Marriages between close relatives should be avoidedbecause it includes more
(1) Recessive alleles to come together
(2) Mutations
(3) Multiple births
(4) Blood group abnormalities

25. Hypertrichosis is :-
(1) Holandric character
(2) X-Linked character
(3) Diagenic character
(4) Sex-influened character

26. Organisms with two or more than two types of genotypes in their tissues are called :-
(1) Wobble (2) Heterozygous
(3) Heterosis (4) Chimera

27. Products of somatic hybridisation are :-
(1) Hybridoma (2) Hybrid-vigour
(3) Heterosis (4) Super-hybrids

28. In which of the following the inheritance takes placeonly by male :-
(1) Nuclear
(2) Cytoplasmic
(3) co-dominanc
(4) Holandric inheritance

29. What shall be the ratio of heterozygous, homozygous and hemizygous in offsprings of a colour blind husband & a carrier wife :-
(1) 1:1:2 (2) 1:1:1
(3) 2:1:1 (4) 1:2:1

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

31. A gene located on Y-chromosome and therefore, transmitted from father to son is known as:-
(1) Supplementary gene
(2) Complementary gene
(3) Duplicate gene
(4) Holandric gene

32. The condition in which only one allele of a pair is present is known as :-
(1) Homozygous
(2) Heterozygous
(3) Hemizygous
(4) Incomplete dominance

33. Colourblindness is a :-
(1) Sex limited character
(2) Sex linked character
(3) Sex influenced character
(4) None

34. What is the effect of sexual reproduction :-
(1) Offspring is weak
(2) Offspring is like the parent
(3) Offspring is more vigorous
(4) Offspring is diseased

35. Blue eye colour in human is recessive to brown eye colour. The expected children of a marriage between a blue eyed woman and a brown eyed man who had a blue eyed mother will be-
(1) All black eyed
(2) All blue eyed
(3) All brown eyed
(4) One blue eyed and one brown eyed

36. Baldness in man is a :-
(1) Autosomal character
(2) Sex linked character
(3) Sex influenced character
(4) 1 and 3 both

37. Andalucian fowl exhibits :-
(1) Blending inheritance (2)Mosaic inheritance
(3) Epistasis (4) Co-dominance

38. 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

39. A woman with normal vision marries a man with normal vision and gives birth to a colourblind son. Her husband dies and the 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 & daughter carrier
(3) All daughter colourblind & sons normal
(4) 50% sons colourblind and all daughters normal

40. A hybrid is generally more vigorous than either of the parents, this is due to :-
(1) Homozygosity
(2) Heterozygosity
(3) Superior genes in hybrid
(4) Mixing of cytoplasm

41. Albinism is determined by a recessive gene in man . the presence of albinism in 50% children born to a couple proves that :-
(1) Both parents are heterozygous for albinism
(2) Father is homozygous normal and mother is heterozygous
(3) Father is homozygous for albinism but mother is heterozygous
(4) Both are homozygous

42. Epistatic gene differs from dominant gene in :-
(1) Epistatic gene is non-allelic
(2) Epistatic gene never express itself independently
(S) Epistatic and hypostatic genes are present at different loci
(4) All the above

43. A dihybrid ratio of 1:4:6:4:1 is obtained instead of 9:3:3:1. This is an example of :-
(1) Complementary gene
(2) Supplementary gene
(3) Polygenic inheritance
(4) Incomplete dominance

44. A gene that shows it's effect on more than one character is :-
(1) Polygene (2) Pleotropic gene
(3) Multifactor gene (4) Multiple gene

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

46. An example of the quantitative trait in man is :-
(1) Hair colour (2) Colour of eye
(3) Skin colour (4) Shape of nose

47. Appearance of walnut-comb in poultry on a cross between pure pea-comb and rose-comb animals due to :-
(1) Duplicate genes
(2) Complementary genes
(3) Additive gene
(4) Collaborative supplementary gene

48. Polygenic inheritance was first noted by :-
(1) Davenport (2) Galton
(3) Mendel (4) Kolreuter

49. A single recessive trait which can express its effect should occur on :-
(1) Any autosome
(2) Any-chromosome

(3) X-chromosome of female
(4) X- chromosome of male

50. Sex- linked characters are generally :-
(1) Lethal (2) Recessive
(3) Dominant (4) Not inherited

51. The technique of the production of monoclonal antibodies was initially developed by :-
(1) Stewards & skoog
(2) Lister & Koch
(3) Arber & Haberlandt
(4) Kohler & Milstein

52. In a lymphocyte - myeloma type of hybridoma the antibody forming ability is derived from
(1) Myelomas only
(2) Lymphocytes only
(3) Partly from lymphocytes and partly from myelomas
(4) Myelomas to greater extent and lymphocytes to a lesser extent

53. If dominant C and P genes are essential for the development of purple colour in sweet pea flowers, what would be the ratio of white and purple colour in a cross between CcPpx Ccpp
(1) 5 : 3 (2) 9 -.7
(3) 2:6 (4) 6 : 2

54. Blood grouping in humans is controlled by:-
(1) 4 alleles in which IA is dominant
(2) 3 alleles in which IA and IB are dominant
(3) 2 alleles in which none is dominant
(4) 3 alleles in which IA is recessive

55. In Drosophila crossing over occurs in female but not in male. Gene A and B are 10 map unit apart on chromosome. A female Drosophila with genotype $\frac{AB}{ab}$ and male Drosophila with AB genotype $\frac{AB}{ab}$ How many type of gametes are produced by female and male Drosophila respectively
(1) 4 types : 2 types (2) 2 types : 2 types
(3) 4 types : 4 types (4) 4 types : one types

56. 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 produced phenotypic ratio in what ratio :-
(1) 1 : 2 : 1
(2) 9 : 3 : 3 : 1
(3) 1 : 4 : 6 : 4 : 1
(4) 1 : 6 : 15 : 20 : 15 : 6 : 1

57 In duroc jersey hog, the coat colour is dependant on two pairs of alleles, R and r and S and s. Any genotype containing at least one R-gene and at least one S-gene results in red coat colour.The double recessive genotype results in white coat colour. All other genotypes results in sandy coat colour. If one hog with genotype "RrSs" mated with another hog with genotype "rrss" what kind of offsprings will be produced by above cross :-
(1) 9 red : 6-sandy : 1 white
(2) 9 red : 3-sandy : 4 white
(3) 12 red : 3-sandy : 1 white
(4) 1 red : 2-sandy : 1 white

58. 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

59. A scientist performed the gene mapping experiments in maize. He mapped the genes on chromosomes on the basis of % crossing over between different genes. One map unit corresponds to one % crossing over or recombination. The genes showing more than 50% recombination were not supposed to be linked on same chromosome. In crossing over studies on maize, scientist observed the following % crossing over between genes A, B, C, D - between. A and D 10%, between A and C 3%, between genes C and D 7%, between genes A and B 5%, and between genes C and B 8%. On the basis of above observation find out the correct sequence of genes A, B, C and D on chromosomes :-
(1) BCDA (2) ABCD
(3) BACD (4) DACB

60. 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

61 Match the type of gene interaction in column 'A' with phenotypic ratio (F2) in column 'B':-

A	B
(p) Incomplete dominance (Monohybrid)	(i) 15 : 1
(q) Supplimentary gene action (dihybrid)	(ii) 1:2:1
(r) Duplicate gene	(iii) 9:6:1
(s) Additive gene effect	(iv) 9 : 3 : 4

(1) p-i, q-ii, r-iii s-iv
(2) p-i, q-ii, r-iv s-iii
(3) p-iv,q-iii, r-ii • s-i
(4) p-ii, q-iv, r-i s-iii

62. In maize coloured endosperm (C) is dominant over colourless (c) and full endosperm (R) is dominant over shrunken (r). When a dihybrid of Fl-generation was test crossed it produced four phenotypes in the following percentage

Coloured and Full = 45%
Coloured - Shrunken = 5%
Colourless - Full = 4%
Colourless - Shrunken = 46%

From these data what would be distance between the two non allelic genes :-
(1) 48 unit (2) 9 unit
(3) 4 unit (4) 12 unit

63. 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

64. Independent assortment of genes does not takes place when :-
(1) Genes are located on homologous chromosomes
(2) Genes are linked and located on same chromosome
(3) Genes are located on non-homologous chromosome
(4) All the above

65. What is true for monoclonal antibodies
(1) These antibodies obtained from one parent and for one antigen.
(2) These obtained from different parents and for one antigen
(3) These obtained from one parent and for many antigens
(4) These obtained from many parents and for many antigen

66. Ratio of complementary genes is
(1) 9 : 3 : 4 (2) 12 : 3 : 1
(3) 9 : 3 : 3 : 4 (4) 9 : 7

67. A and B genes are linked. What shall be genotype of progeny in a cross bet. AB/ab and ab/ab :
(1) AAbb and aabb (2) AaBb and aabb
(3) AABB and aabb (4) None

68. Two nonallelic genes produces the new phenotype when present together but fail to do so independently then it is called :-
(1) Epistatisis
(2) Polygene
(3) Non complimentary gene
(4) Complimenatry gene

69. 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

70. Which of the following is the example of pleiotropicgene :-
(1) Haemophilia (2) Thalaessemea
(3) Sickle cell anaemia (4) Colour blindness

71. 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) None

72. 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) $\leq$ 50% (4) 100%

73. Pattern baldness, moustaches and beard in human males are examples of
(1) Sex linked traits
(2) Sex limited traits
(3) Sex differentiating traits
(4) Sex-determining

74. 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

75. 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

76. 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.

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

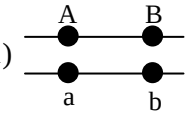
78. Lack of independent assortment of two genes A and B in fruit fly Drosophila is due to :-
(1) Crossing over (2) Repulsion
(3) Recombination (4) Linkage

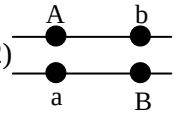
79. A normal woman, whose father was colour-blind is married to a normal man. The sons would be
(1) All colour-blind (2) 75% colour-blind
(3) 50% colour-blind (4) All normal

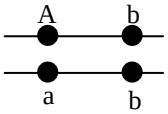
80. In totmato, genotype aabbcc produces lOOg tomatoes and AABBCC produces 160g tomatoes. What is contribution of each polygene in the production of tomatoes:-
(1) 10 g (2) 20 g
(3) 30g (4) 40g

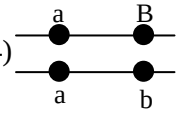
81. If father shows normal genotype and mother shows a carrier trait for haemophelia
(1) All the female children will be carrier
(2) A male child has 50% chances of active disease
(3) Female child has probability of 50% to active disease
(4) All the female children will be colourblind

82. Which of the following show linkage group in coupling phase :-

(1) 

(2) 

(3) 

(4) 

83. In a family, father has a blood group 'A1 and mother has a blood group 'B'. Their children show 50% probability for a blood group 'AB' idicating that
(1) Father is heterozygous
(2) Mother is heterozygous
(3) Either of parent is heterozygous
(4) Mother is homozygous

84. In a plant three dominant independently assorting gene A, B and C are essential for production of purple pigment. !f any of the genes or all three genes are present in recessive condition then flower is colourless

Raw material $\xrightarrow{A} \times \xrightarrow{B} Y \xrightarrow{C} Z$ pigment

A purple plant with genotype AABBCC crossed with a colourless plant with genotype aabbcc gives purple Fj hybrid. On self ing of F:-what proportion of coloured offspring in F2 -

(1) $\frac{27}{64}$ (2) $\frac{1}{64}$

(3) $\frac{9}{64}$ (4) $\frac{37}{64}$

85. When a red grain variety of wheat is crossed with another white grain variety a Fj-hybrid is produced. On self ing of this Ft- hybrid, how many offsprings of F2 - generation resemble phenotypically to it's parents (let grain colour of wheat controlled by three gene pairs)
(1) 2/16 (2) 20/64
(3) 15/64 (4) 2/64

86. Epistasis differs from dominance because
(1) In epistasis one gene pair mask the expression of another pair of genes
(2) Epistasis is an allelic interaction
(3) Many genes collectively controls a particular

phenotype
(4) One gene pair independently controls a particular phenotype

87. In a plant flower colour is the example of polygenic trait and controlled by one gene pair. How many plants show parental phenotype in F2 generation:-
(1) $\frac{2}{16}$ (2) $\frac{2}{4}$
(3) $\frac{2}{64}$ (4) $\frac{2}{256}$

88. In Drosophila several alleles exhibit same phenotype for eg. W+s, W+c, W+s exhibit eye colour these alleles are called :-
(1) Pseudoalleles (2) Iso atleles
(3) Multiple alleles (4) All the above

89. (A) Pleiotropic genes have multiple phenotypic effect.
(B) Muliple 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

90. Which is not correctly matched :
(1) Agrobacterium => Ti-plasmid
(2) Cosmid => Vector DNA
(3) Rhizobium => Asymbiotic N2 -fixer
(4) Albinism => Autosomal recessive gene

91. In Drosophila a set of homeiotic genes which controls body plan at the time of organ differentiation known as :
(1) TATA-box
(2) Homeobox
(3) Pribnow box
(4) All the above

92. The longer the chromosome of an organism, the more genetic variability it gets from :-
(1) Independent assortment
(2) Linkage
(3) Crossing over
(4) Mutation

93. 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

94. In a genetic cross having recessive epistasis, F2 phenotypic ratio would be :-
(1)9:6:1 (2) 15:1
(3) 9:3:4 (4)12:3:1

95. Which of the following is not a hereditary disease
(1) Haemophilia
(2) Cretinism
(3) Cystic fibrosis
(4) Thalassaemia

96. 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

97. 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

98. A man and a woman,who do not show any apparent signs of a certain inherited disease, have seven children (2 daughters and 5 sons). Three of the sons suffer from the given disease but none of the daughters are affected. Which of the following mode of inheritance do you suggest for this disease
(1) Sex-limited recessive
(2) Autosomal dominant
(3) Sex-linked recessive
(4) Sex-linked dominant

99. Grain colour in wheat is determined by three pairs of polygenes. Following cross AABBCC (dark colour) x aabbcc (light colour), in F2 generation what proportion of the progeny is likely to resemble either parent ?

(1) None
(2) Less than 5 per cent
(3) One third
(4) Half

EXERCISE-3 ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A.	3	1	4	1	2	3	3	4	3	3	1	3	1	2	3
Q.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A.	1	4	4	2	3	4	4	3	1	1	4	1	4	2	4
Q.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
A.	4	3	2	3	4	4	1	3	1	2	3	4	3	2	3
Q.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
A.	3	4	4	4	2	4	2	1	2	1	4	4	3	3	3
Q.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
A.	4	2	1	2	2	4	2	4	2	3	1	3	2	3	1
Q.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
A.	2	4	4	3	1	2	1	3	1	4	1	2	2	2	3
Q.	91	92	93	94	95	96	97	98	99						
A.	2	3	2	3	2	2	2	3	2						