BIOLOGY

BOOKS - MTG BIOLOGY (ENGLISH)

PRINCIPLES OF INHERITANCE & VARIATION

Mcqs

1. Among the seven pairs of contrasting traits in pea plant as studied by Mendel, the number of traits related to flower, pod and seed respectively were

A. 2,2,2

B. 2,2,1

C. 1,2,2

D. 1,1,2

Answer: A

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2. The colour based contrasting traits in seven contrasting pairs, studied by Mendel in pea plant were

A. 1

B. 2

C. 3

D. 4

Answer: C

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3. _____ pairs of contrasting traits were studied by Mendel in pea plant

A. 6

B. 7

C. 8

D. 10

Answer: B

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4. Some of the dominant traits studied by Mendel were

A. rounded seed shape, green seed colour and axial flower position

B. terminal flower position, green pod colour and inflated pod shape

C. violet flower colour, yellow pod colour, round seed shape

D. wrinkled seed shape, yellow pod colour, and axial flower position

Answer: C

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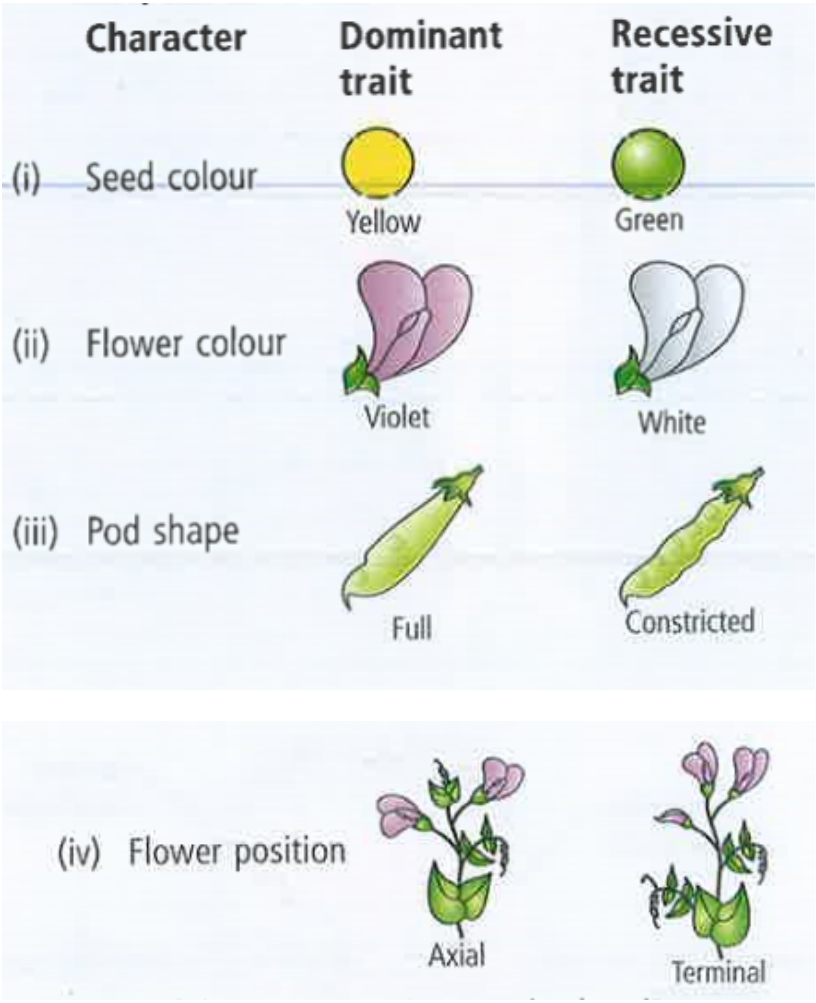
5. Refer to given table of contrasting traits in pea plants studied by Mendel



Which of the given traits is correctly placed ?

A. (i),(ii) and (iii) only

B. (ii),(iii) and (iv) only

C. (ii) and (iii) only

D. (i),(ii),(iii) and (iv)

Answer: D

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6. Which of the following characters was not chosen by Mendel ?

A. Pod shape

B. Pod colour

C. Location of flower

D. Location of pod

Answer: D

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7. Genes which code for a pair of contrasting traits are known as

A. dominant genes

B. alleles

C. linked genes

D. none of these

Answer: B

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8. A recessive allele is expressed in

A. heterozygous condition only

B. homozygous condition only

C. F_3 generation

D. both homozygous and heterozygous conditions

Answer: B

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9. The characters which appear in the first filial generation are called

A. recessive characters

B. dominant characters

C. holandric characters

D. lethal characters

Answer: B

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10. What will be the distribution of phenotypic features in the first generation after a cross between a homozygous female and a heterozygous male for a single locus ?

A. $3:1$

B. $1:2:1$

C. $1:1$

D. none of these

Answer: C

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11. In a monohybrid cross between two heterozygous individuals, percentage of pure homozygous individuals obtained in F_1 generation will be

A. $25\ \%$

B. $50\ \%$

C. $75\ \%$

D. $100\ \%$

Answer: B

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12. On crossing two heterozygous tall plants (Tt), a total of 500 plants were obtained in F_1 generation. What will be the respective number of tall and dwarf plants obtained of F_1 generation ?

A. $375, 125$

B. $250, 250$

C. $475, 25$

D. $350, 150$

Answer: A

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13. In mice, black coat colour (allele B) is dominant to brown coat colour (allele b). The offspring of a cross between a black mouse (BB) and a brown mouse (bb) were allowed to interbreed. What percentage of the progeny would have black coats ?

A. $25\ \%$

B. $50\ \%$

C. $75\ \%$

D. $100\ \%$

Answer: C

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14. In fruits flies, long wing is dominant to vestigial wing. When heterozygous long-winged flies were crossed with vestigial-winged flies, 192 offsprings were produced. If an exact Mendelian ratio had been obtained, then the number of each phenotype would have been

A.	Long-winged 64	Vestigial-winged 128
B.	Long-winged 96	Vestigial-winged 96
C.	Long-winged 128	Vestigial-winged 64
D.	Long-winged 192	Vestigial-winged 0

Answer: B

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15. What is the probility of production of dwarf offsprings in a cross between two heterozygous tall pea plants ?

A. Zero

B. 50 %

C. 25 %

D. 100 %

Answer: C

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16. A tobacco plant heterozygous for recessive character is self-pollinated and 1200 seeds are subsequently germinated. How many seedings would have the parental genotype ?

A. 1250

B. 600

C. 300

D. 2250

Answer: B

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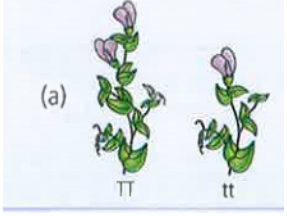
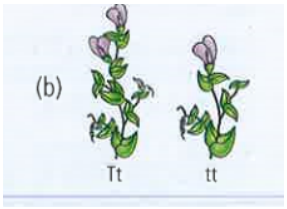
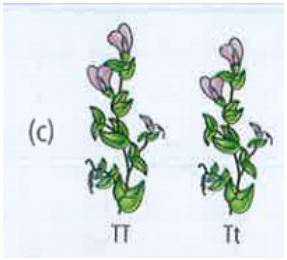
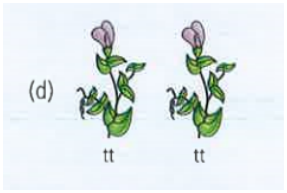
17. Which of the following crosses will give tall and dwarf pea plants in same proportions ?

A. 

B. 

C. 

D. 

Answer: B

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18. To determie the genotype of a tall plant of F_2 generation, Mendel crossed this plant with a dwarf plant. This cross represents a

A. test cross

B. back cross

C. reciprocal cross

D. dihybrid cross

Answer: A

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19. Read the given statements and select the correct option

Statement 1 : Test cross is used to determine an unknown genotype within one breeding generation

Statement 2 : Test cross is a cross between F_1 hybrid and dominant parent.

A. Both statements 1 and 2 are correct

B. Statement 1 is correct but statement 2 is incorrect

C. Statement 1 is incorrect but statement 2 is correct

D. Both statement 1 and 2 are incorrect

Answer: B

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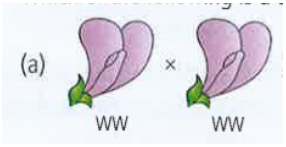
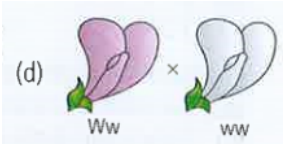
20. Which of the following is a test cross ?

A. 

B. 

C. 

D. 

Answer: D

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21. Fruit shape in shephered purse (Capsella bursa) is of two types- triangular and top-shaped. Triangular fruit shape (T) is dominant over top-shape (t). Following table summarises the results of several crosses.

Cross	Result
Strain $1 \times tt$	All triangular
Strain $2 \times tt$	1 triangular : 1 top-shaped
strain $3 \times tt$	All top-shaped
Strain $4 \times Tt$	3 triangular : 1 top-shaped

Which pair of strains possess the genotyoe Tt ?

A. Strains 2 and 3

B. Strain 2 and 4

C. Strains 1 and 3

D. Strains 1 and 4

Answer: B

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22. Mendel formulated the law of of purity of gametes on the basis of

A. monohybrid cross

B. dihybrid cross

C. test cross

D. back cross

Answer: A

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23. Read the given statements and select the correct option

Statement 1 : The law of segregation is one of the most important contributions to the biology

Statement 2 : It introduced the concept of heredity factors as discrete physical entities which do not become blended.

A. Both statements 1 and 2 are correct

B. Statement 1 is correct but statement 2 is incorrect

C. Statement 1 is incorrect but statement 2 is correct

D. Both statement 1 and 2 are incorrect

Answer: A

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24. The inheritance of flower colour in Antirrhinum (dog flower) is an example of

A. incomplete dominance

B. co-dominance

C. multiple alleles

D. linkage

Answer: A

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25. In Antirrhinum (dog flower), phenotypic ratio in F_2 generation for the inheritance of flower colour would be

A. $3:1$

B. $1:2:1$

C. $1:1$

D. $2:1$

Answer: B

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26. Phenotypic and genotypic ratio is similar in case of

A. complete dominance

B. incomplete dominance

C. over dominance

D. epistasis

Answer: B

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27. If four o' clock plants, the gene for red flower colour (R) is incompletely dominant over the gene for white flower colour (r), hence the plants heterozygous for flower colour (Rr) have pink flower. What will be the ratio of offsprings in a cross between the red flowers and pink flowers ?

A. $75\ \%$ red flower, $25\ \%$ pink flowers

B. All red flowers

C. $50\ \%$ red flowers, $50\ \%$ pink flowers

D. Red : pink : white :: 1 : 2 : 1

Answer: C

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28. Andalusian fowls have two pure forms - black and white. If black forms (BB) and white forms (WW) are crossed F_1 individuals appear blue coloured (BW), due to incomplete dominance. Which of the following would be an outcome of a cross between black form and blue form ?

A. 1 Blank : 2 Blue : 1 White

B. 2 Black : 1 Blue

C. 1 Black : 2 Blue

D. 1 Black : 1 Blue

Answer: D

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29. Complete the given table showing different possililities of genotypes and their corresponding blood group, by selecting the correct option

Genotypes	Blood groups
I^AI^A, (i)	A
I^BI^B, (ii)	B
(iii)	AB
(iv)	O

A. (i) I^AI^A (ii) I^BI^B (iii) I^AI^B (iv) ii

B. (i) I^AI^A (ii) I^BI^B (iii) I^AI^B (iv) I^Ai

C. (i) I^Ai (ii) I^Bi (iii) I^AI^B (iv) ii

D. (i) I^Ai (ii) I^Bi (iii) I^AI^B (iv) I^Bi

Answer: C

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30. ABO blood groups in human beings are controlled by the gene I. The gene I has three alleles $-I^A, I^B$ and i. Since there are three different alleles, six different genotypes are possible

How many phenotypes can occur ?

A. Six

B. Two

C. Three

D. Four

Answer: D

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31. What can be the blood group of offspring when both parents have AB blood group ?

A. AB only

B. A,B and AB

C. A,B,AB and O

D. A and B only

Answer: B

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32. A child has blood groups 'O'. If father has blood group 'A' and mother has blood group 'B'. Work out the genotypes of the partents

A. I^AI^A and I^Bi

B. I^Ai and I^Bi

C. I^Ai and ii

D. ii and I^BI^B

Answer: B

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33. Inheritance of roan coat in cattle is an example of

A. incomplete dominance

B. codominance

C. multiple allelism

D. none of these

Answer: B

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34. A cow with red coat is crossed with a bull having white coat. Their offspring produced in F_1 generation showed roan coat. This effect is produced due to juxtaposition of small patches of red and white colour. What can be assumed about the gene controlling coat colour in cattle ?

A. The alleles of gene controlling coat colour show a perfect dominant recessive relationship

B. The alleles of gene controlling coat colour are imcompletely dominant

C. The alleles of gene controlling coat colour are codominant

D. none of these

Answer: C

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35. ABO blood grouping in human beings cites the example of

A. incomplete dominance

B. co-dominance

C. multiple allelism

D. both (b) and (c)

Answer: D

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36. In mice Y is the dominant allele for yellow fur and y is the recessive allele for grey fur. Since Y is lethal when homozygous, the result of cross $Yy \times Yy$ will be

A. 3 yellow : 1 grey

B. 2 yellow : 1 grey

C. 1 yellow : 1 grey

D. 1 yellow : 2 grey

Answer: B

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37. In Mendelian dihybrid cross, when heterozygous Round Yellow are self crossed, Round Green offsprings are represented by the genotype

A. RrYy,RrYY,RRYy

B. Rryy,Rryy,rryy

C. rrYy,rrYY

D. Rryy,RRyy

Answer: D

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38. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Dihybrid test cross	(i)	9 : 3 : 3 : 1
B.	Law of segregation	(ii)	Dihybrid cross
C.	Lawof independent assortment	(iii)	1 : 1 : 1 : 1
D.	ABO blood group in man	(iv)	Purity of gametes
		(v)	Multiple allelism

A. A-(iii),B-(iv),C-(ii),D-(v)

B. A-(i),B-(iv),C-(ii),D-(v)

C. A-(iii),B-(ii),C-(iv),D-(v)

D. A-(ii),B-(v),C-(iii),D-(i)

Answer: A

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39. The percentage of ab gamete produced by AaBb parent will be

A. $25\ \%$

B. $50\ \%$

C. $75\ \%$

D. $12.5\ \%$

Answer: A

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40. When a cross is made between a tall plant with yellow seeds (Tt Yy) and a tall plant with green seeds (Tt yy), what is true regarding the proportions of phenotypes of the offsprings in F_1 generation ?

A.

Proportion of Tall and Green	proportion of Dwarf and Green
$\frac{3}{8}$	$\frac{1}{8}$

B.

Proportion of Tall and Green	proportion of Dwarf and Green
$\frac{2}{8}$	$\frac{1}{8}$

C.

Proportion of Tall and Green	proportion of Dwarf and Green
$\frac{1}{8}$	$\frac{3}{8}$

D.

Proportion of Tall and Green	proportion of Dwarf and Green
$\frac{2}{8}$	$\frac{2}{8}$

Answer: A

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41. How many types of gametes can be produced by a diploid organism who is heterozygous for 4 loci ?

A. 4

B. 8

C. 16

D. 32

Answer: C

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42. The given Punnett's square represents to Pattern of inheritance in a dihybrid cross where yellow (Y) and round (R) seed condition in dominant over white (y) and wrinkled (r) seed condition

	YR	Yr	yR	yr
YR	F	J	N	R
Yr	G	K	O	S
yR	H	L	P	T
yr	I	M	Q	U

A plant of type 'H' will produce seeds with the genotype identical to seeds produced by the plants of

A. Type M

B. Type J

C. Type P

D. Type N

Answer: D

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43. Read the given paragraph to answer

In a certain plant, yellow fruit colour (Y) is dominant to green fruit colour (y) and round shape (R) is dominant to oval shape (r). The two genes involved are located on different chromosomes.

Which of the following will result when plant YyRr is self-pollinated ?

A. $9:3:3:1$ ratio of phenotypes only

B. $9:3:3:1$ ratio of genotypes only

C. $1:1:1:1$ ratio of phenotypes only

D. $1:1:1:1$ ratio of phenotypes and genotypes

Answer: A

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44. Read the given paragraph to answer

In a certain plant, yellow fruit colour (Y) is dominant to green fruit colour (y) and round shape (R) is dominant to oval shape (r). The two genes involved are located on different chromosomes.

Which of the following is correct for the condition when plant YyRr is back crossed with the double recessive parent ?

A. $9:3:3:1$ ratio of phenotypes only

B. $9:3:3:1$ ratio of genotypes only

C. $1:1:1:1$ ratio of phenotypes only

D. $1:1:1:1$ ratio of phenotypes and genotypes

Answer: D

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45. When two pairs of traits are combined in a hybrid, segregation of one pair of characters is independent of the other pair of characters. The statement explains which of the following laws/principles of Mendel ?

A. (a) Principle of paired factors

B. (b) Principle of dominance

C. (c) Law of segregation

D. (d) Law of independent assortment

Answer: D

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46. Law of independent assortment can be explained with the help of

A. dihybrid cross

B. test cross

C. back cross

D. monohybrid cross

Answer: A

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47. Mendel's work was rediscovered by three scientists in the year

A. 1865

B. 1900

C. 1910

D. 1920

Answer: D

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48. Which three scientists independently rediscovered Mendel's work ?

A. Avery, McLeod, McCarty

B. Sutton,Morgan and Bridges

C. Bateson, Punnet and Bridges

D. de Vries, Corren and Tschermak

Answer: B

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49. Chromosomal theory of inheritance was given by

A. Morgan et al

B. Sutton and Boveri

C. Hugo de Vries

D. Gregor J. Mendel

Answer: B

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50. Experimental verification of chromosomal theory of inheritance was done by

A. Sutton and Boveri

B. Morgan et al

C. Henking

D. Kari Correns

Answer: B

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51. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Multiple allelism	(i)	$Tt \times tt$
B.	Back cross	(ii)	$Tr \times TT$
C.	Test cross	(iii)	Human blood groups
D.	Crossing over	(iv)	Non-parental gene combination
E.	Recombination	(v)	Non-sister chromatids

A. A-(iii),B-(i),C-(ii),D-(v),E-(iv)

B. A-(iii),B-(ii),C-(i),D-(v),E-(iv)

C. A-(iii),B-(ii),C-(i),D-(iv),E-(v)

D. A-(iv),B-(ii),C-(i),D-(v),E-(iii)

Answer: B

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52. Genes located very close to one another on same chromosome tend to be transmitted together and are called as

A. allelomorphs

B. identical genes

C. linked genes

D. recessive genes

Answer: C

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53. True-breeding red-eyed Drosophila flies with plain thoraxes were crossred with pink-eyed flies with striped thoraxes

$$\begin{array}{lcl} \text{Red eye} & \times & \text{Pink eye} \\ \text{Plain thorx} & & \text{striped throrax} \end{array}$$

The F_1 flies were then test crossed against the double recessive

The following F_2 generation resulted from the cross :

80	16	12	92
Red eye	Red eye	Pink eye	Pink eye
Plain thorax	Striped thorax	Plain thorax	Striped thorax

What percentage number of recombinats resulted from the test cross ?

A. 12

B. 14

C. 16

D. 28

Answer: B

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54. Depending upon the distance between any two genes which is inversely proportional to the strength of linkage, cross overs will vary from

A. $50 - 100\,\%$

B. $0 - 50\,\%$

C. $75 - 100\ \%$

D. $100 - 150\ \%$

Answer: B

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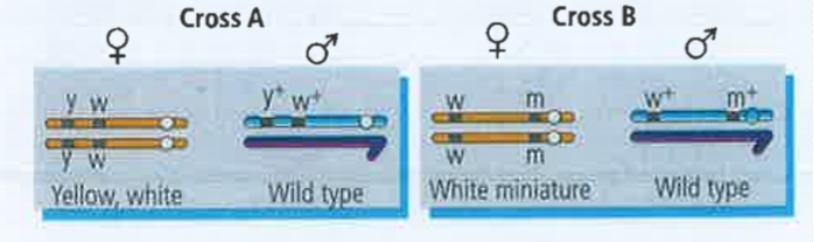
55. Refer to the given figure of cross A and cross B and select the correct statement regarding them



A. In cross A, the strength of linkage between genes y and w is higher than the cross B genes w and ,

B. In cross A, t he strength of linkage between genes y and w is less than the cross B genes w and m

C. Both cross A gnes y and w and cross B have the same strength of linkage

D. The percentage of recombinants produced in cross A is higher than cross B

Answer: A

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56. What is true about the crossing over between linked genes ?

A. No crossing over at all

B. High percentage of crossing over

C. Hardly any crossing over

D. none of these

Answer: C

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57. Chromosome maps/genetic maps were first prepared by

A. Sutton and Boveri (1902)

B. Bateson and punnett (1906)

C. Morgan (1910)

D. Sturtevant (1911)

Answer: D

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58. The distance between the genes is measured by

A. angstrom

B. map unit

C. Dobson unit

D. millimetre

Answer: B

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59. If map distance between genes P and Q is 4 units, between P and R is 11 units, and between Q and R is 7 units, the order of genes on the linkage map can be traced as follows

A. 

B. 

C. 

D. 

Answer: C

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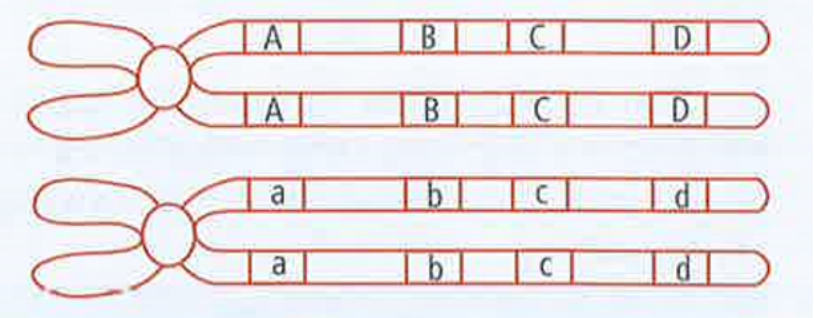
60. Given diagram shows a pair of homologous chromosomes during meiosis



Maximum crossing over will occur between genes

A. A and a,D and d

B. C and d, c and D

C. B and c, b and C

D. A and d, a and D

Answer: D

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61. Which of the following is suitable for experiment on linkage ?

A. aaBB $\times$ aaBB

B. AABB $\times$ aabb

C. AaBb $\times$ AaBb

D. AAbb $\times$ AaBB

Answer: B

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62. Mendel law of independent assortment does not hold true for the genes that are located closely on

A. same chromosome

B. non-homologous chromosomes

C. X-chromosome

D. autosomes

Answer: A

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63. If linkage was known at the time of Mendel then which of the following laws, he would not have been able to explain ?

A. Law of dominance

B. Law of independent assortment

C. Law of segregation

D. Law of purity of gametes

Answer: B

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64. In maize, coloured endosprem (C) is dominant over colourless (c) , and full endosperm (R) is dominant over shrunken (r). When a dihybrid of F_1 generation was test crossed, it produced four phenotypes in the following percentage :

Coloured full - 48 % Coloured shrunken - 5 %

Colourless full - 7 % Colourless shrunken - 40 %

From this data, what will be the distance between two non-allelic genes ?

A. 48 units

B. 5 units

C. 7 units

D. 12 units

Answer: D

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65. Which of the following are reasons for Mendel's success ?

(i) Usage of pure lines or pure breeding varieties

(ii) Consideration of one character at a time

(iii) Maintenance of statistical records of experiments

(iv) Knowledge of linkage and incomplete dominance

A. (i) and (ii) only

B. (i),(ii) and (iii)

C. (i) and (iv) only

D. (ii),(iii) and (iv)

Answer: B

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66. In polygenic inheritance

A. many genes govern a single character

B. heterozygous organisms express only one allele itself

C. heterozygous organisms express both alleles

D. a single gene influences many characters

Answer: A

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67. In a cross between negro and albino skin colour of humans showing polygenic inheritance, the phenotypic ratio in F_2 generation will be

A. $9:3:3:1$

B. $1:6:15:20:15:6:1$

C. $1:4:6:4:1$

D. $1:2:2:4:1:2:1:2:1$

Answer: B

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68. What proportion of the offsprings obtained from cross AABBCC $\times$ AaBbCc will be completely heterozygous for all the genes segregated independently ?

A. $1/8$

B. $1/4$

C. $1/2$

D. $1/16$

Answer: A

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69. Refer the given statements and select the correct option

(i) Percentage of homozygous dominant individuals obtained by selfing Aa individuals is 25 %

(ii) Types of genetically different gametes produce by genotype AABbcc are 2

(iii) Phenotypic ratio of monohybrid F_2 progeny in case of Mirabilis jalapa is $3:1$

A. All the statements are true

B. Statements (i) and (ii) are true, but statement (iii) is false

C. Statement (i) and (iii) are true, but statement (ii) is false

D. Statements (ii) and (iii) are true, but statement (i) is false

Answer: B

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70. A man having the genotype EEFfGgHH can produce P number of genetically different sperms, and a woman of genotype liLLMmNn can generate Q number of genetically different eggs. Determine the values P and Q.

a. P = 4, Q = 4

b. P = 4,Q = 8

c. P = 8, Q = 4

d. P = 8,Q = 8

A. P = 4, Q = 4

B. P = 4,Q = 8

C. P = 8, Q = 4

D. P = 8,Q = 8

Answer: B

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71. A pleiotropic gene:

1) controls a trait only in combination with another gene

2) controls multiple traits in an individual

3) is expressed only in primitive plants

4) is a gene evolved during Pliocene

A. controls a trait only n combination with another gene

B. controls multiple traits in an individual

C. is expressed only in primitive plants

D. is a gene evolved during Pliocene

Answer: B

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72. The gene disorder phenylketonuria is an example for

A. multiple allelism

B. polygenic inheritance

C. multiple factor

D. pleiotropy

Answer: D

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73. Genes with multiple phenotypic effects are known as

A. hypostatic genes

B. duplicate genes

C. pleiotropic genes

D. complementary genes

Answer: C

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74. When a single gene influences more then one trait it is called

A. pseudodominance

B. pleiotropy

C. epistasis

D. none of these

Answer: B

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75. Pleiotropic genes have

A. repressed phenotype

B. hidden phenotype

C. multiple phenotype

D. all of these

Answer: C

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76. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Gregor J, Mendel	(i)	Chromosomal theory of inheritance
B.	Sutton and Boveri	(ii)	Laws of inheritance
C.	Henking	(iii)	Drosophila
D.	Morgan	(iv)	Discovered X-body

A. A-(ii),B-(i),C-(iv),D-(iii)

B. A-(iv),B-(i),C-(ii),D-(iii)

C. A-(iv),B-(ii),C-(i),D-(iii)

D. A-(ii),B-(iii),C-(iv),D-(i)

Answer: A

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77. XO type of sex determination and XY type of sex determination are the examples of:

a. male heterogamety

b. female heterogamety

c. male homogamety

d. both (b) and (c)

A. male heterogamety

B. female heterogamety

C. male homogamety

D. both (b) and (c)

Answer: A

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78. In XO type of sex determination

A. females produce two different types of gametes

B. males produce two different types of gametes

C. females produce gametes with Y chromosome

D. males produce gametes with Y chromosome

Answer: B

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79. Which of the following is incorrect regarding ZW-ZZ type of sex determination ?

A. It occurs in birds and some reptiles

B. Females are homogametic and males are heterogametic

C. $1:1$ sex ratio is produced in the offsprings

D. all of these

Answer: B

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80. A couple has six daughters. What is the possibility of their having a girl next time ?

A. $10\ \%$

B. $50\ \%$

C. $90\ \%$

D. $100\ \%$

Answer: B

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81. Select the correct statements regarding honeybees

(i) The queen bee and the worker bees develop from fertilised eggs and are sexually females

(ii) Males (drones) develop parthenogenetically from unfertilised eggs

(iii) Queen bee feeds upon royal jelly and the worker bees feed upon bee bread.

A. (i) and (ii)

B. (ii) and (iii)

C. (i) and (iii)

D. (i),(ii) and (iii)

Answer: D

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82. Number of autosomes present in liver cells of a human female is:

a. 22 autosomes

b. 22 pairs

c. 23 autosomes

4. 23 pairs

A. 22 autosomes

B. 22 pairs

C. 23 autosomes

D. 23 pairs

Answer: B

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83. In honeybees, females are $\underline{\text{(i)}}$ having $\underline{\text{(ii)}}$ chromosomes and males are $\underline{\text{(iii)}}$ having $\underline{\text{(iv)}}$ chromosomes

A. $\begin{matrix} \text{(i)} & \text{(ii)} & \text{(iii)} & \text{(iv)} \\ \text{diploid} & 46 & \text{haploid} & 23 \end{matrix}$

B. $\begin{matrix} \text{(i)} & \text{(ii)} & \text{(iii)} & \text{(iv)} \\ \text{haploid} & 23 & \text{diploid} & 46 \end{matrix}$

C. $\begin{matrix} \text{(i)} & \text{(ii)} & \text{(iii)} & \text{(iv)} \\ \text{diploid} & 23 & \text{haploid} & 16 \end{matrix}$

D.

(i)	(ii)	(iii)	(iv)
haploid	23	diploid	32

Answer: C

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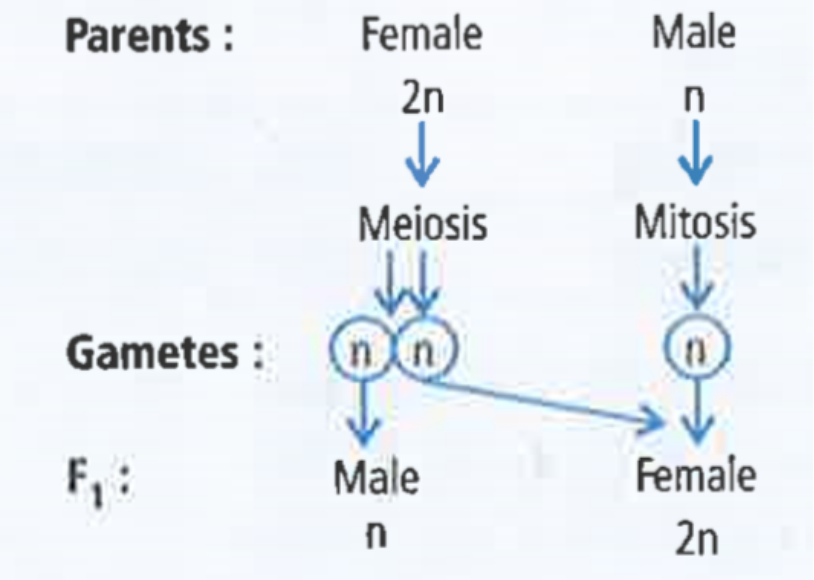
84. Refer to the given figure



This type of sex determination is found in

A. grasshoppers and cockroaches

B. birds and reptiles

C. butterflies and moths

D. honeybess, ants and wasps

Answer: D

View Text Solution

85. Rate of mutation is affected by:

1. temperature

2. X-rays

3. gamma rays

4. all of these

A. temperature

B. X-rays

C. gamma rays

D. all of these

Answer: D

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86. Insertion or deletion of a single base causes

A. inversion mutation

B. transition mutation

C. frame-shift mutation

D. transversion mutation

Answer: C

Watch Video Solution

87. Point mutation may occur due to

A. alteration in DNA sequence

B. change in a single base pair of DNA

C. deletion of a segment of DNA

D. gain of a segment in DNA

Answer: B

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88. Select the incorrect statement regarding pedigree analysis

A. Solid symbols show unaffected individuals

B. Proband is the person from which case history starts

C. It is useful for genetic counsellors

D. It is an alalysis of traits in several generations of a family

Answer: A

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89. Which one is the incorrect match ?

A. 

B. 

C. 

D. 

Answer: C

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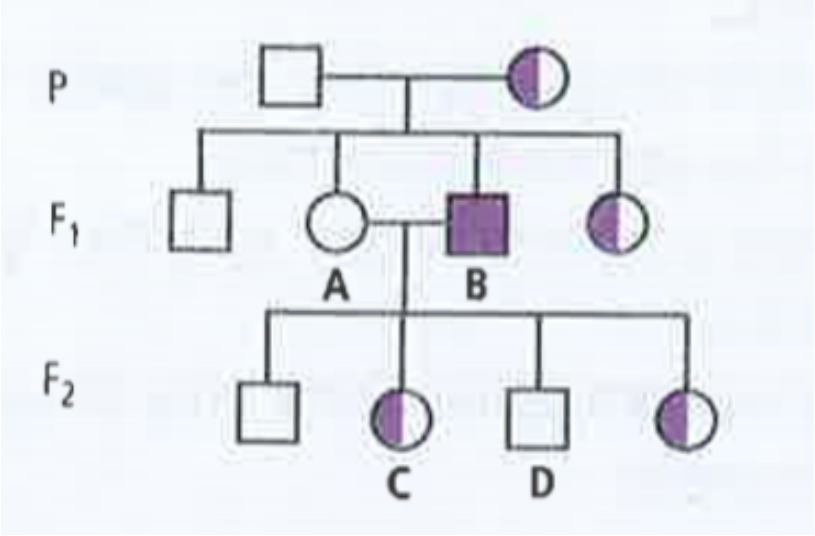
90. Study the given pedigree chart showing the inheritance if an X-linked trait controlled by gene 'r'



What will be the genotypes of individuals A,B,C and D respectively ?

A. XX, X^rY, X^rX, XY

B. X^rX^r, XY, XX, XY

C. $X^rX, X^rY^r, X^rX^r, X^rY$

D. XX, X^rY^r, XX, XY

Answer: A

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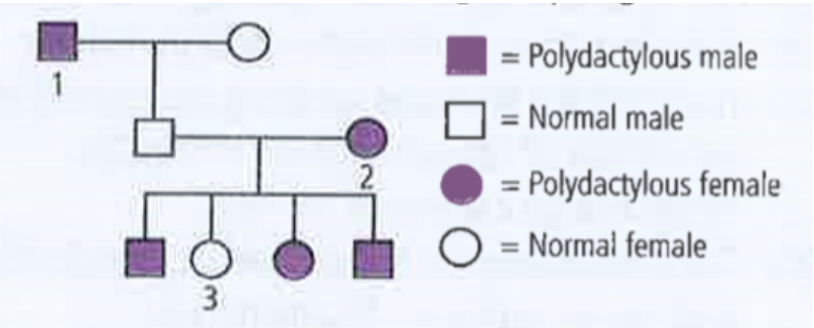
91. In humans polydactyly (i.e., presence of extra fingers and toes) is determined by a dominant autosomal allele (P) and the normal condition is determined by a recessive allele (p). Find out the possible genotypes of family members 1,2 and 3 in the given pedigree



A. 1 PP 2 Pp 3 pp

B. 1 PP 2 PP 3 pp

C. 1 Pp 2 PP 3 Pp

D. 1 Pp 2 Pp 3 pp

Answer: D

View Text Solution

92. Fused ear lobes appear in the progeny due to an autosomal recessive gene, Work out the genotypes of members in the given pedigree

A.

I-2	II-3	II-1
aa	Aa	Aa

B.

I-2	II-3	II-1
aa	AA	AA

C.

I-2	II-3	II-1
Aa	Aa	Aa

D.

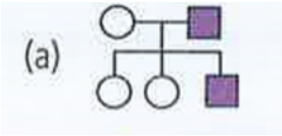
I-2	II-3	II-1
aa	Aa	AA

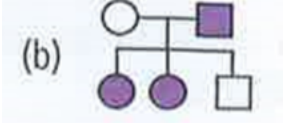
Answer: A

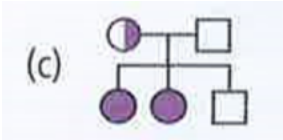
View Text Solution

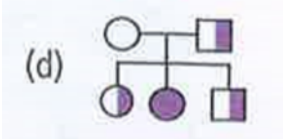
93. Wife is PTC non-taster and husband is PTC taster. Their son is taster but daughters are non-tasters. This is not a sex linked trait. Which pedigree is correct ?

A.



B. 

C. 

D. 

Answer: A

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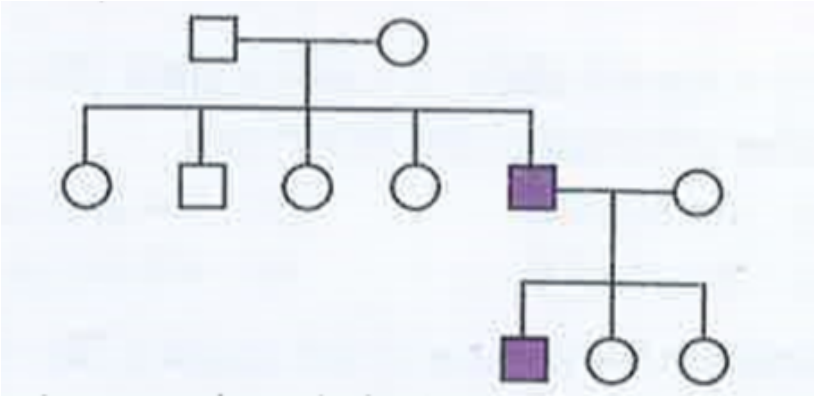
94. In the following pedigree chart, the mutant trait is shaded black. The gene responsible for the trait is



A. dominant and sex linked

B. dominant and autosomal

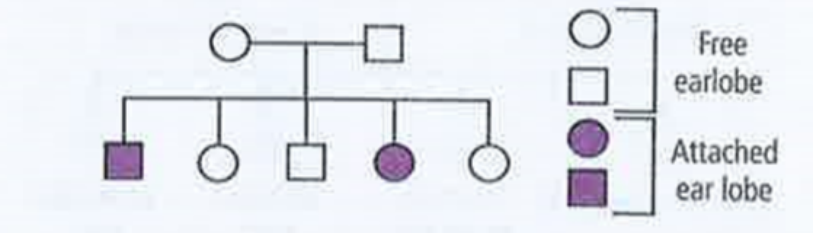
C. recessive and sex linked

D. recessive and autosomal

Answer: D

View Text Solution

95. Given pedigree chart depicts the inheritance of attached ear lobes, an autosomal recessive trait



Which of the following conclusions drawn is correct ?

A. Parents are heterzygous

B. Parents are homozygous dominant

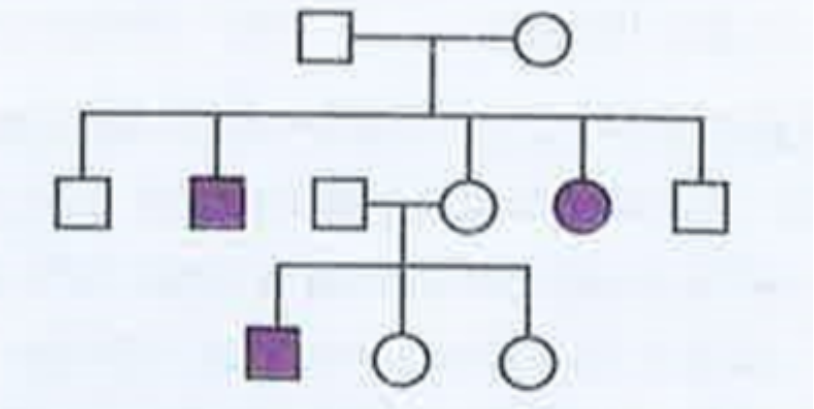
C. Parents are homozygous recessive

D. none of these

Answer: A

View Text Solution

96. Study the pedigree chart of a family showing the inheritance of sickle-cell anaemia



The trait traced in the above pedigree chart is

A. dominant X-linked

B. recessive X-linked

C. autosomal dominant

D. autosomal recessive

Answer: D

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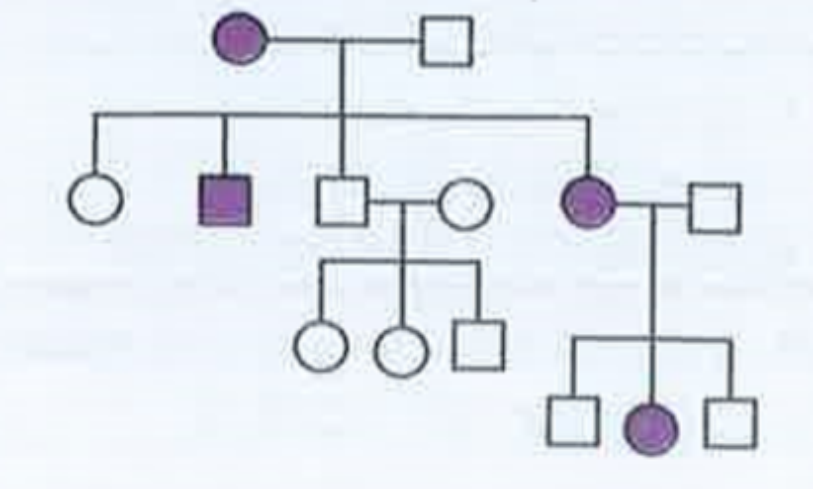
97. Study the pedigree chart of a family showing the inheritance of myotonic dsytrophy



The trait under study is

A. dominant X-linked

B. recessive X-linked

C. autosomal dominant

D. recessive Y-linked

Answer: C

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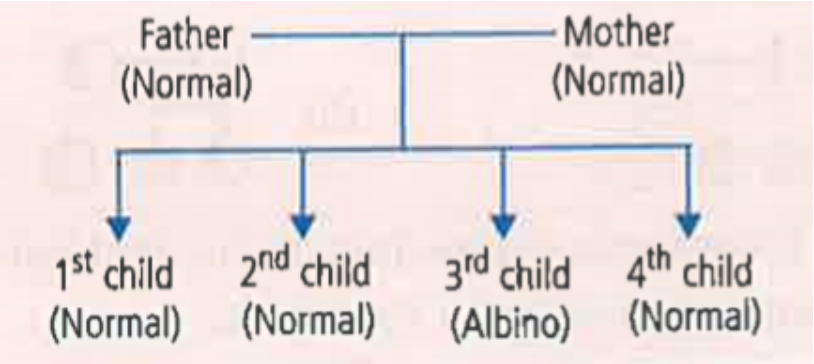
98. Refer to the given family tree and answer the question



If A= normal allele, a = albino allele, then genotypes of father and mother are respectively

A. Aa and Aa

B. AA and Aa

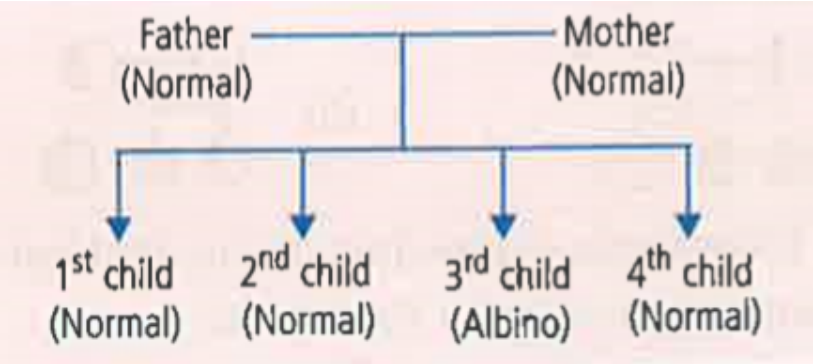
C. Aa and AA

D. Aa and aa

Answer: A

View Text Solution

99. Refer to the given family tree and answer the question



What are the chances of this couple's fifth child being an albino ?

A. 1 in 1

B. 1 in 2

C. 1 in 3

D. 1 in 4

Answer: D

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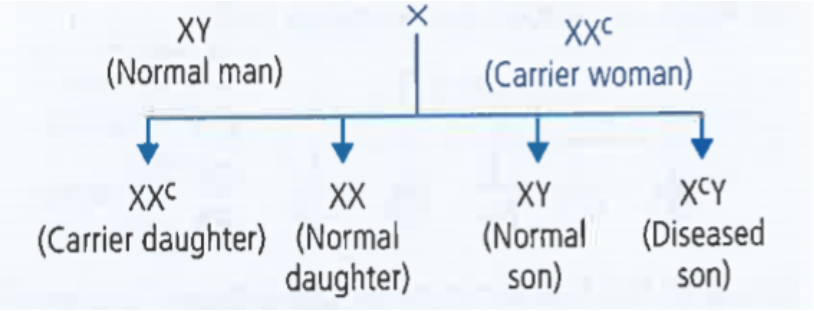
100. Inheritance of which of the following traits is shown in the given cross ?



A. X-linked dominant trait

B. X-linked recessive trait

C. autosomal recessive trait

D. Autosomal dominant trait

Answer: B

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101. _____ is an example of X-linked recessive trait

A. Phenylketonuria

B. Haemophilia

C. Cystic fibrosis

D. Sickle-cell anaemia

Answer: B

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102. If a haemophilic man marries a carrier woman than which of the following holds true for their progenies ?

A. 50 % daughters are carrier and 50 % are haemophilic

B. All the daughters are haemophilic

C. All sons are haemophilic and all daughters are normal

D. All sons normal, all daughters carriers

Answer: A

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103. The possibility of a female becoming haemophilic is extremely rare because mother of such a female has to be at least __(i)__ and father should be __(ii)__

A. (i) haemophilic, (ii) carrier

B. (i) carrier, (ii) haemophilic

C. (i) haemophilic, (ii) normal

D. (i) haemophilic, (ii) haemophilic

Answer: B

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104. Result of a cross between a normal homozygous female and a haemophiliac male would be

A. normal males and normal females

B. haemophilic males and normal females

C. normal males and carrier females

D. haemophilic males and carrier females

Answer: C

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105. Father of a child is colourblind and mother is carrier for colourblindness, the probability of the child being colour blind is

A. $25\ \%$

B. $50\ \%$

C. $100\ \%$

D. $75\ \%$

Answer: B

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106. A coloured man (X^cY) marries a woman who is carrier for haemophilia $\left(XX^h\right)$. Which of the following is true for their progenies ?

A. $25\ \%$ female progenies carry the genes foe both haemophilia and colourblindness

B. $25\ \%$ male progenies carry only the gene for haemophilia

C. $25\ \%$ female progenies carry only the gene for colourblindness

D. all of these

Answer: D

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107. A marriage between a colourblind man and a normal woman produces

A. all carrier daughters and normal sons

B. $50\ \%$ carrier dauthters, $50\ \%$ normal daughters

C. $50\ \%$ colourblined sons, $50\ \%$ normal sons

D. all carrier offsprings

Answer: A

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108. Red green colourblindness is a sex linked trait. Which of the given statements is not correct regarding colourblindness ?

A. It is more common in males than in females

B. Homozygous recessive condition is required for the expression of colourblindness in females.

C. Males can be carriers of the trait

D. Colourblind women always have colourblind father and always produce colorblined son.

Answer: C

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109. The disease sickle-cell anaemia is caused by the substitution of __(i)__ by __(ii)__ at the __(iii)__ position of __(iv)__ globin chain of haemoglobin molecule

Which of the following correctly fills the blanks in the above statements ?

A. (i) valine, (ii) glutamic acid, (iii) sixth, (iv) beta

B. (i) glutamic acid, (ii) valine, (iii) sixth, (iv) beta

C. (i) glutamic acid, (ii) valine, (iii) fifth, (iv) beta

D. (i) valine,(ii) glutamic acid, (iii) fifth, (iv) beta

Answer: B

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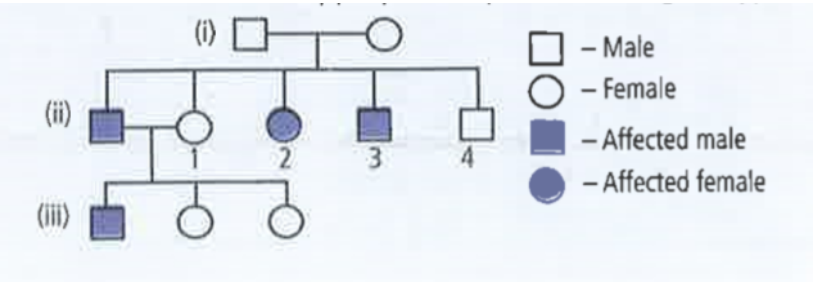
110. Study the given pedigree chart for sickle-cell anaemia and select the most appropriate option for the genotypes



A. Genotypes of parents Hb^AHb^S, Hb^AHb^A Genotypes of 1st and 3rd child in F_1 Hb^AHb^A, Hb^AHb^S

B. Genotypes of parents Hb^AHb^S, Hb^AHb^S Genotypes of 1st and 3rd child in F_1 Hb^AHb^A, Hb^AHb^A

C. Genotypes of parents Hb^AHb^A, Hb^AHb^S Genotypes of 1st and 3rd child in F_1 Hb^AHb^A, Hb^SHb^S

D. Genotypes of parents Hb^AHb^S, Hb^AHb^S Genotypes of 1st and 3rd child in F_1 Hb^AHb^S, Hb^SHb^S

Answer: D

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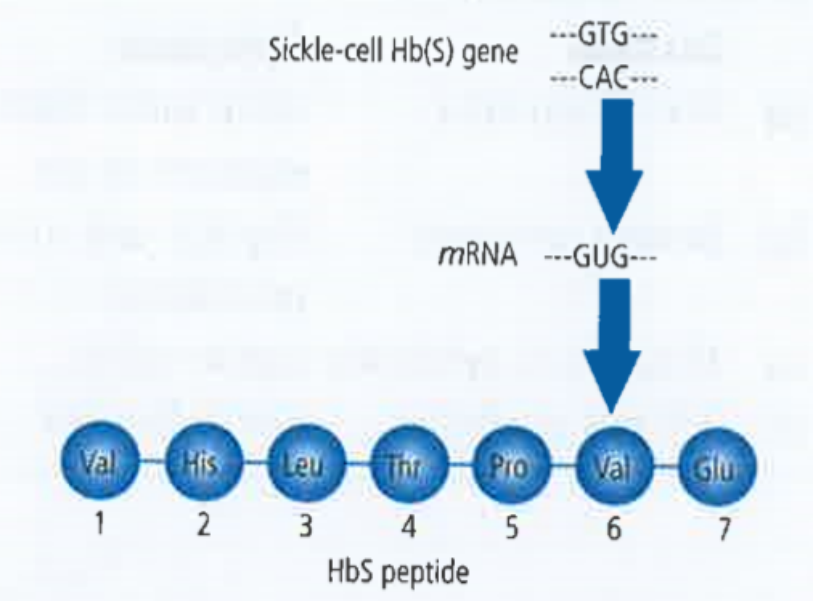
111. Refer to the give figure



The shape of RBCs under oxygen tension in the given situation becomes

A. beconcave disc like

B. elongated and curved

C. circular

D. spherical

Answer: B

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112. An individual affected by phenylketonuria lacks an enzyme that converts the amino acid _____ into _____

A. tyrosine, pheylalanine

B. phenylalanine, tyrosine

C. homogentisic acid, phenylalanine

D. homogentisc acid, tyrosine

Answer: B

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113. Which of the following is not a example of recessive autosomal disease ?

A. Haemophilia

B. Cystic fibrosis

C. Pheylketonuria

D. Sickle-cell anaemia

Answer: A

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114. If both parents are carriers for thalassaemia, which is an autosomal recessive disorder what are the chances of pregnancy resulting in an affected child ?

A. $25\ \%$

B. $100\ \%$

C. No chance

D. $50\ \%$

Answer: A

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115. Select the disease which is caused by recessive autosomal genes when present in homozygous condition

A. (a) Alkaptonuria

B. (b) Albinism

C. (c) Cystic fibrosis

D. (d) all of these

Answer: D

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116. In this disease, there occurs a failure of chloride ion transport mechanism in cell surface membrane of epithelial cells, Sweat of the

patient contains very high level of Na^+ and Cl^- ions. The disease is

A. (a) thalassaemia

B. (b) Alzheimer's disease

C. (c) Gaucher's disease

D. (d) cystic fibrosis

Answer: D

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117. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Sickle cell anaemia	(i)	7th chromosome
B.	Pheylketonuria	(ii)	4th chromosome
C.	Cystic fibrosis	(iii)	11th chromosome
D.	Huntington's disease	(iv)	X-chromosome
E.	Colourblindness	(v)	12th chromosome

A. A-(iii),B-(v),C-(ii),D-(i),E-(iv)

B. A-(iii),B-(v),C-(i),D-(ii),E-(iv)

C. A-(v),B-(iv),C-(ii),D-(iii),E-(i)

D. A-(iv),B-(ii),C-(iii),D-(i),E-(v)

Answer: B

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118. Which of the following trait is controlled by dominant autosomal genes ?

A. Polydactyly

B. Huntington's chorea

C. PTC (phenylthiocarbamide) tasting

D. all of these

Answer: D

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119. Refer the given statements

(i) Incomplete or mosaic inheritance is an example of pre-Mendelian concept of blending inheritance

(ii) Test cross is a special type of back cross

(iii) Chromosomal aberrations are commonly observed in cancer cells

(iv) Thalassaemia is a Mendelian disorder

Which of the above statements are correct ?

A. (i) and (ii) only

B. (ii),(iii) and (iv)

C. (ii) and (iv) only

D. (i) and (iv) only

Answer: B

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120. Failure of segregation of chromatids during cell division results in the gain or loss of chromososmes, this is called as

A. euploidy

B. monoploidy

C. aneuploidy

D. polyploidy

Answer: C

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121. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Autopolyploidy	(i)	2n+1
B.	Trisomy	(ii)	AAAA
C.	Allopolyploidy	(iii)	AABB
D.	Nullisomy	(iv)	2n-2

A. A-(ii),B-(i),C-(iii),D-(iv)

B. A-(iv),B-(i),C-(ii),D-(iii)

C. A-(ii),B-(iv),C-(iii),D-(i)

D. A-(ii),B-(i),C-(iv),D-(iii)

Answer: A

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122. Failure of cytokinesis after telophase stage of cell division results in an increase in a whole set of chromosomes in an organism. The phenomenon is called as

A. polyploidy

B. aneuploidy

C. haploidy

D. diploidy

Answer: A

Watch Video Solution

123. Match column I with colimn II and select the correct option from the given codes

	Column I		Column II
A.	Autosomal recessive trait	(i)	Down's syndrome or mo
B.	Sex-linked rec essive trait	(ii)	Pheylketonuria
C.	Metabolic erorr lined to autosomal recessive trait	(iii)	Haemophilia
D.	Additional 22st chromosome anaemia	(iv)	Sickle cell

A. A-(ii),B-(i),C-(iv),D-(iii)

B. A-(iv),B-(i),C-(ii),D-(iii)

C. A-(iv),B-(iii),C-(ii),D-(i)

D. A-(iii),B-(iv),C-(i),D-(ii)

Answer: C

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124. Klinefelter's syndrome is characterised by a karyotype of

A. XYY

B. XO

C. XXX

D. XXY

Answer: D

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125. Which of the following is mismatched pair of disease and its related symptom ?

A.

Disease	Symptom
Phenylketonuria	Urine turns black on exposure to air

B.

Disease	Symptom
Down's syndrome	Physical and mental retardation

C.

Disease	Symptom
Klinefelter's syndrome	Sterile males

D.

Disease	Symptom
Turner's syndrome	Sterile females

Answer: A

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126. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Turner's syndrome	(i)	Trisomy
B.	Linkage	(ii	AA + XO
C.	Y-chromosome	(iii)	Morgan
D.	Down's syndrome	(iv)	TDF

A. A-(ii),B-(i),C-(iv),D-(iii)

B. A-(iv),B-(i),C-(ii),D-(iii)

C. A-(iv),B-(ii),C-(i),D-(iii)

D. A-(ii),B-(iii),C-(iv),D-(i)

Answer: D

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127. Due to nondisjunction of chromosomes during spermatogensis, some sperms carry both sex chromosomes (22A + XY) and some sperms do not carry any sex chromosome (22A + O). If these sperms fertilise normal eggs (22A + X), what types of genetic disorders respectively appear among the offspring ?

A. Klinefelter's syndrome and Turner's syndrome

B. Turner's syndrome and Klinefelter's syndrome

C. Down's syndrome and Turner's syndrome

D. Down's syndrome and cri-du-chat syndrome

Answer: A

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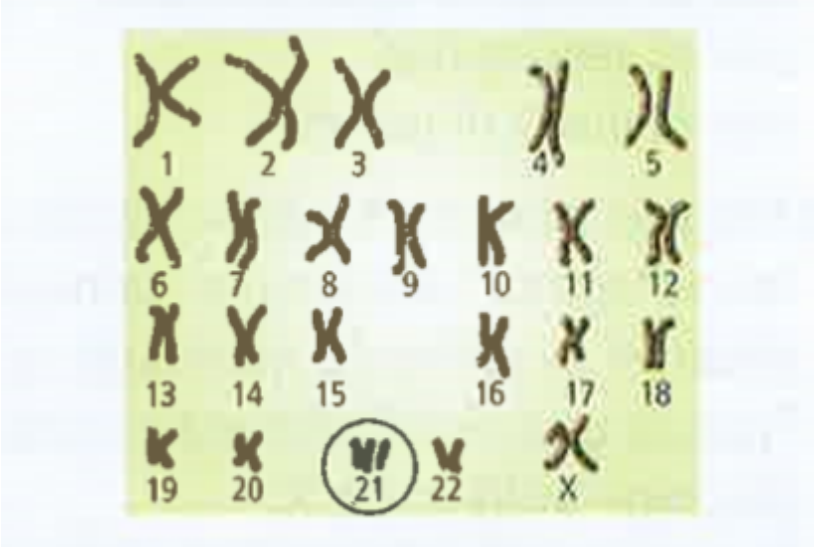
128. Refer to the given figure representing karyotype of individual who inflicted with this chromosomal disorder



Select the correct statement regarding them.

A. This disorder occurs due to failure of segregation of chromatids during cell division cycle results in the gain of chromosome

B. This disorder occurs due to failure of cytokinesis after telophase stage of cell division results in an increases in whole set of chromosome

C. Individuals inflicted with this disorder are usually sterile

D. Both (a) and (c)

Answer: A

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129. Find out the mismatched pair

A. Haemophilia - Sex linked recessive

B. Cystic fibrosis - Autosomal recessive

C. Down's syndrome - Trisomy 21

D. Turner's syndrome - Y-linked

Answer: D

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130. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Chromosomal aberration	(i)	An additional sex chromosome
B.	Down' syndrome	(ii)	Inversion
C.	Klinefelter's syndrome	(iii)	Presence of an extra chromosome
D.	Turner's syndrome	(iv)	absence of sex chromosome

A. A-(ii),B-(iv),C-(i),D-(iii)

B. A-(ii),B-(iv),C-(iii),D-(i)

C. A-(ii),B-(iii),C-(i),D-(iv)

D. A-(iii),B-(iv),C-(i),D-(ii)

Answer: C

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Hots

1. In human, attached earlobes are a dominant feature over free earlobes while hypertrichosis (Y-linked) feature. A man with attached earlobed and extensive hair on pinna married a woman having free earlobes. The couple had one son with free earlobes and hairy pinna and two daughters with attached earlobes. One of the daughters with attached earlobes. One of he daughters married a man with free earlobes and

sparse hair on pinna. They had two sons. What would be the characteristics of their ponnae ?

A. Both will have attached earlobes and sparse hair on pinna

B. There would be equal chances foe both having free or attached earlobes and sparse hair on pinnae

C. They would have hairy pinnae and there would be 1 and 8 chance that both will have attached earlobes

D. Both will have free earlobes and extensive hair on pinnae.

Answer: B

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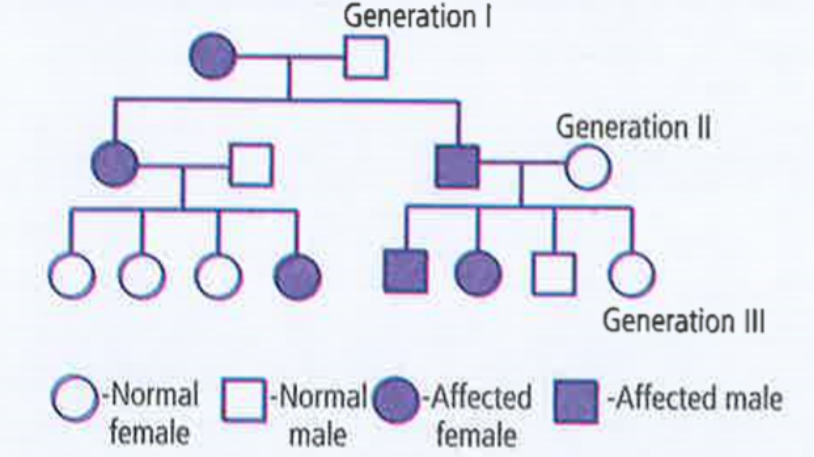
2. A pedigree is shown below for a disease that is autosomal dominant. What would be the genetic make up of the first generation ?



A. AA,Aa

B. Aa,aa

C. Aa,AA

D. Aa,Aa

Answer: B

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3. Study the two cases carefully, What would be the correct interpretation of the two cases ?

Case	Mother	Father	Children
Case I	With disease	Normal	Sons always with disease
Case II	With disease	Normal	Sons and daughters could show disease

A. Case I : X-linked recessive disease
Case II : Autosomal recessive disease

B. Case I : Y-linked recessive disease
Case II : X-linked recessive disease

C. Case I and II : X-linked recessive disease

D. Case I : Y-linked dominant disease
Case II : Autosomal dominant disease

Answer: A

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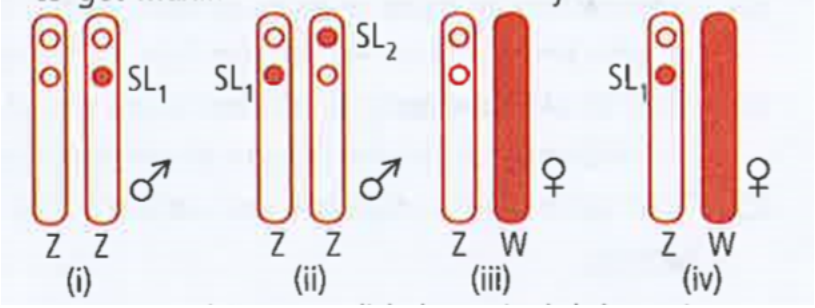
4. Males of silkworm Bombyx more are known to produce more silk per unit quantity of leaf consumed. Hence, they are preferably bred in sericulture industry. Which of the following genotypes should be crossed in order to get maximum fraction of male insects ?



Note : SL_1 and SL_2 are sex-linked recessive lethal mutations

A. (i) and (iv)

B. (i) and (iii)

C. (ii) and (iii)

D. (ii) and (iv)

Answer: B

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5. The allele for pea comb (P) in chickens is completely dominant to the allele for single comb (p) . The alleles for black feather colour (B), and white feather colour (B') show codominance, so that BB' individuals possess blue feathers. If chickens heterozygous for both pairs of genes

are mated what proportion of offspring are expected to be pea combed and white feathered ?

A. $9/16$

B. $3/16$

C. $1/16$

D. $2/16$

Answer: C

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Exemplar

1. All gens located on the same chromosome

A. form different groups depending upon their relative distance

B. form one linkage group

C. will not from any linkage groups

D. from interactive groups that affect the phenotype

Answer: B

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2. Conditions of a karyotype $2n \pm 1$ and $2n \pm 2$ are called

A. aneuploidy

B. polyploidy

C. allopolyploidy

D. monosomy

Answer: A

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3. Distance between the genes and percentage of recombination shows

A. a direct relationship

B. an inverse relationship

C. a parallel relationship

D. no relationship

Answer: A

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4. If a genetic disease is transferred from a phenotypically normal but carrier female to only some of the male progeny, the disease is

A. autosomal dominant

B. autosomal recessive

C. sex-linked dominant

D. sex-linked recessive

Answer: D

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5. In sickle cell anaemia glutamic acid is replaced by valine Which one of the following triplets codes for valine ?

A. G G G

B. A A G

C. G A A

D. G U G

Answer: D

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6. Person having genotype $I^A I^B$ would show the blood group as AB. Thus is because of

A. pleiotropy

B. co-dominance

C. segregation

D. incomplete dominance

Answer: B

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7. ZZ/ZW type of sex determination is seen in

A. platypus

B. snails

C. cockroach

D. peacock

Answer: D

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8. A cross between two tall plants resulted in offspring having few dwarf plants. What would be the genotypes of both the plants ?

A. TT and Tt

B. Tt and Tt

C. TT and TT

D. Tt and tt

Answer: B

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9. In a dihybrid crossm if you get $9:3:3:1$ ratio it denotes that

A. the alleles of two genes are interacting with each other

B. it is a multigenic inheritance

C. it is a case of multiple allelism

D. the alleles of two genes are segregating independently

Answer: D

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10. Which of the following will not result in variations among siblings ?

A. Independent assortment of genes

B. Crossing over

C. Linkage

D. Mutation

Answer: C

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11. Mendel's law of independent assortment holds good for genes situated on the

A. non-homologous chromosomes

B. homologous chromosomes

C. extra nuclear genetic element

D. same chromosome

Answer: B

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12. Occasionally, a single gene may express more than one effect. The phenomenon is called

A. multiple allelism

B. mosaicism

C. pleiotropy

D. polygeny

Answer: C

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13. In a certain taxon of insects some have 17 chromosomes and the others have 18 chromosomes. The 17 and 18 chromosome-bearing organisms are

A. males and females, respectively

B. females and males,respectively

C. all males

D. all females

Answer: A

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14. The inheritance pattern of a gene over generations amoung human is studied by the pedigree analysis. Character studied in the pedigree analysis is equivalent to

A. quantitative trait

B. Mendelian trait

C. polygenic trait

D. maternal trait

Answer: B

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15. It is said that Mendel proposed that the factor controlling any character is discrete and independent. His proposition was based on the

A. results of F_3 generation of a cross

B. observations that the offsprings of a cross made between the plants having two contrasting characters shows only one character without any blending

C. self pollination of F_1 offsprings

D. cross pollination of F_1 generation with recessive parent.

Answer: B

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16. In the F_2 generation a Mendelian dihybrid cross, the number of phenotypes and genotypes are

A. phenotypes-2 , genotypes -16

B. phenotypes-9 , genotypes -4

C. phenotypes-4 , genotypes -8

D. phenotypes-4 , genotypes -9

Answer: D

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17. Mother and father of a person with 'O' blood group have 'A' and 'B' blood group respectively. What would be the genotype of both mother and father ?

A. Mother is homozygous for 'A' blood groups and father is heterozygous for 'B'

B. Mother is heterozygous for 'A' blood group and father is homozygous for 'B'

C. Both mother and father are heterozygous for 'A' and 'B' blood group, respectively.

D. Both mother and father are homozygous for 'A' and 'B' blood group respectively.

Answer: C

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Assertion Reason

1. Assertion : Mendel conducted artificial pollination experiments for his genetic studies using true-breeding pea lines

Reason : A true-breeding line shows the stable trait inheritance and expression for several generations

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2. Assertion : At F_2 stage in monohybrid cross, both parental traits are expressed in the proportion of $3:1$

Reason : The contrasting parental traits show blending at F_2 stage

A. If both the assertion and the reason are true and the reason is a correct explanation of the assertion.

B. If both the assertion and the reason are true but the reason is not a correct explanation of the assertion.

C. If the assertion is true but the reason is false.

D. If both the assertion and reason are false.

Answer: C

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3. Assertion : Test cross is the cross between the F_1 progeny and either of the parenty types

Reason : Back cross is rhe cross between F_1 progeny and the double recessive genotype

A. If both the assertion and the reason are true and the reason is a correct explanation of the assertion.

B. If both the assertion and the reason are true but the reason is not a correct explanation of the assertion.

C. If the assertion is true but the reason is false.

D. If both the assertion and reason are false.

Answer: D

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4. Assertion : The pink coloured flowers appear in F_2 generation of plant Mirabilis jalapa

Reason : This is observed due epistatic suppression of white colour alleles in one of parental flowers by red colour alleles

A. If both the assertion and the reason are true and the reason is a correct explanation of the assertion.

B. If both the assertion and the reason are true but the reason is not a correct explanation of the assertion.

C. If the assertion is true but the reason is false.

D. If both the assertion and reason are false.

Answer: C

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5. Assertion : ABO blood group system provides a good example of multiple alleles

Reason : In ABO blood group system, when I^A and I^B alleles are present together, they both express their own types option1 Both Asseration and Reason are correct

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6. Assertion : Pairing and separation of pair of chromosomes would lead to segregation of a pair of factors they carried

Reason : Two alleles of a gene pair are located on similar sites on non-homologous chromosomes

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7. Assertion : The law of independent assortment can be studied by means of dihybrid cross

Reason : The law of independent assortment is applicable only to linked genes

A. A and R both correct and R is correct explanation of A

B. A and R both are correct but R is not correct explanation of A

C. A is true but R is false

D. Both are false

Answer: C

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8. Assertion : When yelow bodied, white eyed Drosophila females were hybridised with brown-bodied, red eyeed males , and F_1 progeny was intercrossed, F_2 ratio deviated from $9:3:3:1$

Reason : When two genes in a dihybrid are on same chromosome, the proportion of parental gene combinations are much higher than the non-parental type

A. If both the assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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9. Assertion : The maxiumum frequency of recombination, that can result from crossing over between linked genes is 50 percent

Reason : Linked genes shown higher frequency of crossing over if distance between them is longer.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: B

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10. Assertion : In pigeons, females are heterogametic and males are homogametic

Reason : In pigeons, females have ZW sex chromosomes and males have ZZ sex chromosomes.

A. If both assertion and reason are true but reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. Assertion is correct but reason is incorrect

D. Both assertion and reason are incorrect

Answer: A

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11. Assertion : Females, homozygous for genes on the X chromosomes do not express a trait more markedly than do hemizygous males

Reason: Dosage compensation mechanism accounts for effective dosage genes in males and females.

A. If both assertion and reason is true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason is false

Answer: A

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12. Assertion : Variety of fruit colours in Cucurbita pepo is result of recessive epistasis

Reason : In recessive epistatsis, a recessive gene at one locus engances the expression of another gene, at a diferent locus.

A. A is true and R is true and R is correct explanation of A

B. A and R both are true and R is not correct explanation of A

C. A is true but R is false

D. Both are false

Answer: D

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13. Assertion : Sickle-cell anaemia is an autosome-linked recessive disorder that can be transmitted if both parents are heterozygous for the gene

Reason : In sickle-cell anaemia, haemoglobin molecule undergoes

polymerisation under low oxygen tension causing the change in shape in RBC

A. A and R both are correct and R is correct explanation of A

B. A and R both are correct and R is not correct explanation of A

C. A is correct but R is incorrect

D. A and R both are incorrect

Answer: B

View Text Solution

14. Assertion : Phenylpyruvic acid is excreted through urine in case of phenylketonuria

Reason : The affected individual lacks enzyme phenylalanine hydroxylase.

A. Both A and R are correct and R is correct explanation of A

B. Both A and R are correct but R is not the correct explanation of A

C. A is correct but R is incorrect

D. Both A and R are incorrect

Answer: A

View Text Solution

15. Assertion : Turner's syndrome is caused due to absence of any one of the X and Y sex chromosome

Reason : Such individuals show masculine as well as feminine development.

A. A and R both are correct and R is correct explanation of A

B. A and R both are correct and R is not the correct explanation of A

C. A is correct and R is incorrect

D. A and R both are incorrect

Answer: D

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Principles Of Inheritance Variation

1. Among the seven pairs of contrasting traits in pea plant as studied by Mendel, the number of traits related to flower, pod and seed respectively were

A. 2,2,2

B. 2,2,1

C. 1,2,2

D. 1,1,2

Answer: A

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2. The colour based contrasting traits in seven contrasting pairs, studied by Mendel in pea plant were

A. 1

B. 2

C. 3

D. 4

Answer: C

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3. _____ pairs of contrasting traits were studied by Mendel in pea plant

A. 6

B. 7

C. 8

D. 10

Answer: B

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4. Some of the dominant traits studied by Mendel were

A. rounded seed shape, green seed colour and axial flower position

B. terminal flower position, green pod colour and inflated pod shape

C. violet flower colour, yellow pod colour, round seed shape

D. wrinkled seed shape, yellow pod colour, and axial flower position

Answer: C

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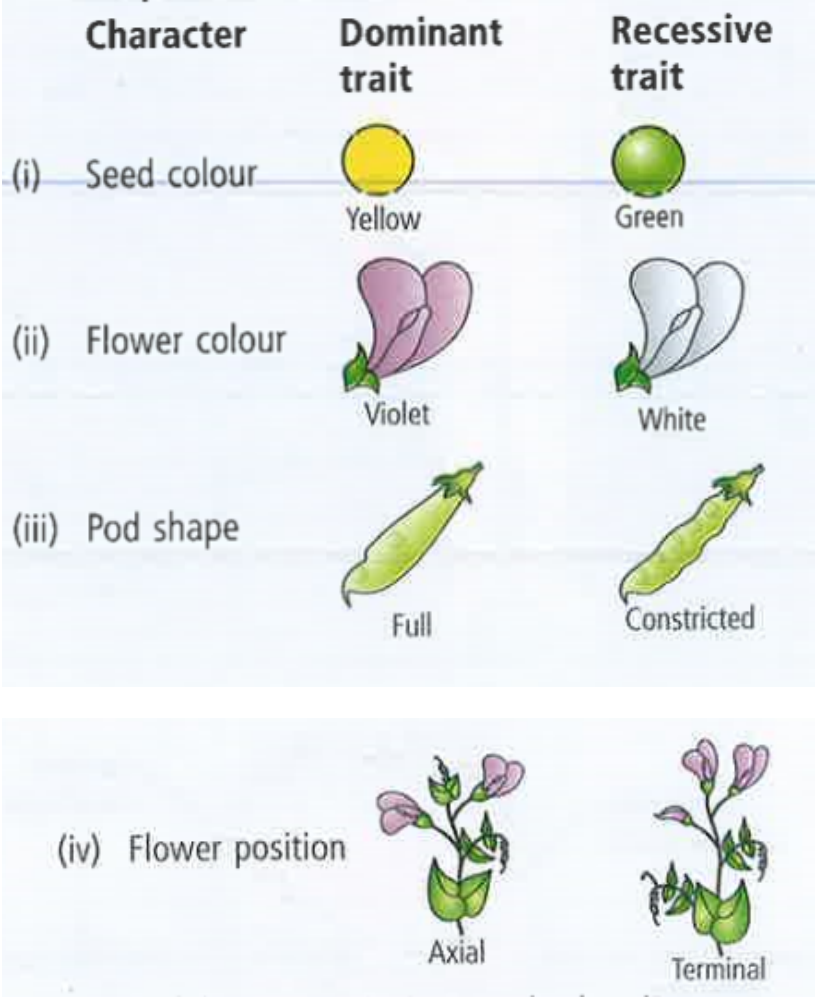
5. Refer to given table of contrasting traits in pea plants studied by Mendel



Which of the given traits is correctly placed ?

A. (i),(ii) and (iii) only

B. (ii),(iii) and (iv) only

C. (ii) and (iii) only

D. (i),(ii),(iii) and (iv)

Answer: D

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6. Which of the following characters was not chosen by Mendel ?

A. Pod shape

B. Pod colour

C. Location of flower

D. Location of pod

Answer: D

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7. Genes which code for a pair of contrasting traits are known as

A. dominant genes

B. alleles

C. linked genes

D. none of these

Answer: B

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8. A recessive allele is expressed in

A. heterozygous condition only

B. homozygous condition only

C. F_3 generation

D. both homozygous and heterozygous conditions

Answer: B

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9. The characters which appear in the first filial generation are called

A. recessive characters

B. dominant characters

C. holandric characters

D. lethal characters

Answer: B

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10. What will be the distribution of phenotypic features in the first generation after a cross between a homozygous female and a heterozygous male for a single locus ?

A. $3:1$

B. $1:2:1$

C. $1:1$

D. none of these

Answer: C

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11. In a monohybrid cross between two heterozygous individuals, percentage of pure homozygous individuals obtained in F_1 generation will be

A. $25\ \%$

B. $50\ \%$

C. $75\ \%$

D. $100\ \%$

Answer: B

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12. On crossing two heterozygous tall plants (Tt), a total of 500 plants were obtained in F_1 generation. What will be the respective number of tall and dwarf plants obtained of F_1 generation ?

A. $375, 125$

B. $250, 250$

C. $475, 25$

D. $350, 150$

Answer: A

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13. In mice, black coat colour (allele B) is dominant to brown coat colour (allele b). The offspring of a cross between a black mouse (BB) and a brown mouse (bb) were allowed to interbreed. What percentage of the progeny would have black coats ?

A. $25\ \%$

B. $50\ \%$

C. $75\ \%$

D. $100\ \%$

Answer: C

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14. In fruits flies, long wing is dominant to vestigial wing. When heterozygous long-winged flies were crossed with vestigial-winged flies, 192 offsprings were produced. If an exact Mendelian ratio had been obtained, then the number of each phenotype would have been

A.

Long-winged	Vestigial-winged
64	128

B.

Long-winged	Vestigial-winged
96	96

C.

Long-winged	Vestigial-winged
128	64

D.

Long-winged	Vestigial-winged
192	0

Answer: B

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15. What is the probility of production of dwarf offsprings in a cross between two heterozygous tall pea plants ?

A. Zero

B. $50\ \%$

C. $25\ \%$

D. $100\ \%$

Answer: C

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16. A tobacco plant heterozygous for recessive character is self-pollinated and 1200 seeds are subsequently germinated. How many seedings would

have the parental genotype ?

A. 1250

B. 600

C. 300

D. 2250

Answer: B

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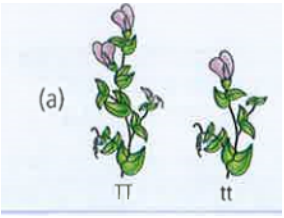
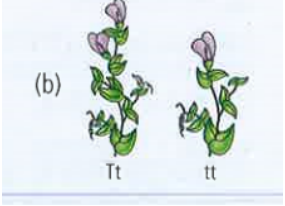
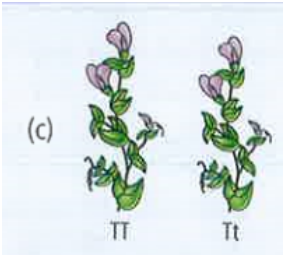
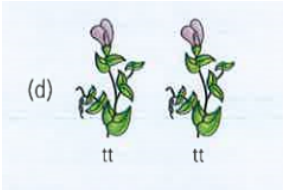
17. Which of the following crosses will give tall and dwarf pea plants in same proportions ?

A. 

B. 

C. 

D. 

Answer: B

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18. To determie the genotype of a tall plant of F_2 generation, Mendel crossed this plant with a dwarf plant. This cross represents a

A. test cross

B. back cross

C. reciprocal cross

D. dihybrid cross

Answer: A

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19. Read the given statements and select the correct option

Statement 1 : Test cross is used to determine an unknown genotype within one breeding generation

Statement 2 : Test cross is a cross between F_1 hybrid and dominant parent.

A. Both statements 1 and 2 are correct

B. Statement 1 is correct but statement 2 is incorrect

C. Statement 1 is incorrect but statement 2 is correct

D. Both statement 1 and 2 are incorrect

Answer: B

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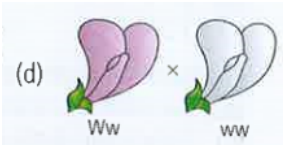
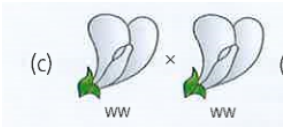
20. Which of the following is a test cross ?

A. 

B. 

C. 

D. 

Answer: D

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21. Fruit shape in shephered purse (Capsella bursa) is of two types- triangular and top-shaped. Triangular fruit shape (T) is dominant over top-shape (t). Following table summarises the results of several crosses.

Cross	Result
Strain $1 \times tt$	All triangular
Strain $2 \times tt$	1 triangular : 1 top-shaped
strain $3 \times tt$	All top-shaped
Strain $4 \times Tt$	3 triangular : 1 top-shaped

Which pair of strains possess the genotyoe Tt ?

A. Strains 2 and 3

B. Strain 2 and 4

C. Strains 1 and 3

D. Strains 1 and 4

Answer: B

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22. Mendel formulated the law of of purity of gametes on the basis of

A. monohybrid cross

B. dihybrid cross

C. test cross

D. back cross

Answer: A

Watch Video Solution

23. Read the given statements and select the correct option

Statement 1 : The law of segregation is one of the most important contributions to the biology

Statement 2 : It introduced the concept of heredity factors as discrete physical entities which do not become blended.

A. Both statements 1 and 2 are correct

B. Statement 1 is correct but statement 2 is incorrect

C. Statement 1 is incorrect but statement 2 is correct

D. Both statement 1 and 2 are incorrect

Answer: A

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24. The inheritance of flower colour in Antirrhinum (dog flower) is an example of

A. incomplete dominance

B. co-dominance

C. multiple alleles

D. linkage

Answer: A

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25. In Antirrhinum (dog flower), phenotypic ratio in F_2 generation for the inheritance of flower colour would be

A. $3:1$

B. $1:2:1$

C. $1:1$

D. $2:1$

Answer: B

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26. Phenotypic and genotypic ratio is similar in case of

A. complete dominance

B. incomplete dominance

C. over dominance

D. epistasis

Answer: B

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27. If four o' clock plants, the gene for red flower colour (R) is incompletely dominant over the gene for white flower colour (r), hence the plants heterozygous for flower colour (Rr) have pink flower. What will be the ratio of offsprings in a cross between the red flowers and pink flowers ?

A. $75\ \%$ red flower, $25\ \%$ pink flowers

B. All red flowers

C. $50\ \%$ red flowers, $50\ \%$ pink flowers

D. Red : pink : white :: 1 : 2 : 1

Answer: C

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28. Andalusian fowls have two pure forms - black and white. If black forms (BB) and white forms (WW) are crossed F_1 individuals appear blue coloured (BW), due to incomplete dominance. Which of the following would be an outcome of a cross between black form and blue form ?

A. 1 Blank : 2 Blue : 1 White

B. 2 Black : 1 Blue

C. 1 Black : 2 Blue

D. 1 Black : 1 Blue

Answer: D

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29. Complete the given table showing different possililities of genotypes and their corresponding blood group, by selecting the correct option

Genotypes	Blood groups
I^AI^A, (i)	A
I^BI^B, (ii)	B
(iii)	AB
(iv)	O

A. (i) I^AI^A (ii) I^BI^B (iii) I^AI^B (iv) ii

B. (i) I^AI^A (ii) I^BI^B (iii) I^AI^B (iv) I^Ai

C. (i) I^Ai (ii) I^Bi (iii) I^AI^B (iv) ii

D. (i) I^Ai (ii) I^Bi (iii) I^AI^B (iv) I^Bi

Answer: C

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30. ABO blood groups in human beings are controlled by the gene I. The gene I has three alleles $-I^A$, I^B and i. Since there are three different alleles, six different genotypes are possible

How many phenotypes can occur ?

A. Six

B. Two

C. Three

D. Four

Answer: D

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31. What can be the blood group of offspring when both parents have AB blood group ?

A. AB only

B. A,B and AB

C. A,B,AB and O

D. A and B only

Answer: B

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32. A child has blood groups 'O'. If father has blood group 'A' and mother has blood group 'B'. Work out the genotypes of the partents

A. I^AI^A and I^Bi

B. I^Ai and I^Bi

C. I^Ai and ii

D. ii and I^BI^B

Answer: B

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33. Inheritance of roan coat in cattle is an example of

A. incomplete dominance

B. codominance

C. multiple allelism

D. none of these

Answer: B

Watch Video Solution

34. A cow with red coat is crossed with a bull having white coat. Their offspring produced in F_1 generation showed roan coat. This effect is produced due to juxtaposition of small patches of red and white colour. What can be assumed about the gene controlling coat colour in cattle ?

A. The alleles of gene controlling coat colour show a perfect dominant recessive relationship

B. The alleles of gene controlling coat colour are imcompletely dominant

C. The alleles of gene controlling coat colour are codominant

D. none of these

Answer: C

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35. ABO blood grouping in human beings cites the example of

A. incomplete dominance

B. co-dominance

C. multiple allelism

D. both (b) and (c)

Answer: D

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36. In mice Y is the dominant allele for yellow fur and y is the recessive allele for grey fur. Since Y is lethal when homozygous, the result of cross $Yy \times Yy$ will be

A. 2 yellow : 1 grey

B. 2 yellow : 1 grey

C. 1 yellow : 1 grey

D. 1 yelloe : 2 grey

Answer: B

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37. In Mendelian dihybrid cross, when heterozygous Round Yellow are self crossed, Round Green offsprings are represented by the genotype

A. RrYy,RrYY,RRYy

B. Rryy,Rryy,rryy

C. rrYy,rrYY

D. Rryy,RRyy

Answer: D

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38. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Dihybrid test cross	(i)	9 : 3 : 3 : 1
B.	Law of segregation	(ii)	Dihybrid cross
C.	Lawof independent assortment	(iii)	1 : 1 : 1 : 1
D.	ABO blood group in man	(iv)	Purity of gametes
		(v)	Multiple allelism

A. A-(iii),B-(iv),C-(ii),D-(v)

B. A-(i),B-(iv),C-(ii),D-(v)

C. A-(iii),B-(ii),C-(iv),D-(v)

D. A-(ii),B-(v),C-(iii),D-(i)

Answer: A

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39. The percentage of ab gamete produced by AaBb parent will be

A. $25\ \%$

B. $50\ \%$

C. $75\ \%$

D. $12.5\ \%$

Answer: A

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40. When a cross is made between a tall plant with yellow seeds (Tt Yy) and a tall plant with green seeds (Tt yy), what is true regarding the proportions of phenotypes of the offsprings in F_1 generation ?

A.

Proportion of Tall and Green	proportion of Dwarf and Green
$\frac{3}{8}$	$\frac{1}{8}$

B.

Proportion of Tall and Green	proportion of Dwarf and Green
$\frac{2}{8}$	$\frac{1}{8}$

C.

Proportion of Tall and Green	proportion of Dwarf and Green
$\frac{1}{8}$	$\frac{3}{8}$

D.

Proportion of Tall and Green	proportion of Dwarf and Green
$\frac{2}{8}$	$\frac{2}{8}$

Answer: A

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41. How many types of gametes can be produced by a diploid organism who is heterozygous for 4 loci ?

A. 4

B. 8

C. 16

D. 32

Answer: C

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42. The given Punnett's square represents to Pattern of inheritance in a dihybrid cross where yellow (Y) and round (R) seed condition in dominant over white (y) and wrinkled (r) seed condition

	YR	Yr	yR	yr
YR	F	J	N	R
Yr	G	K	O	S
yR	H	L	P	T
yr	I	M	Q	U

A plant of type 'H' will produce seeds with the genotype identical to seeds produced by the plants of

A. Type M

B. Type J

C. Type P

D. Type N

Answer: D

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43. Read the given paragraph to answer

In a certain plant, yellow fruit colour (Y) is dominant to green fruit colour (y) and round shape (R) is dominant to oval shape (r). The two genes involved are located on different chromosomes.

Which of the following will result when plant YyRr is self-pollinated ?

A. $9:3:3:1$ ratio of phenotypes only

B. $9:3:3:1$ ratio of genotypes only

C. $1:1:1:1$ ratio of phenotypes only

D. $1:1:1:1$ ratio of phenotypes and genotypes

Answer: A

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44. Read the given paragraph to answer

In a certain plant, yellow fruit colour (Y) is dominant to green fruit colour (y) and round shape (R) is dominant to oval shape (r). The two genes involved are located on different chromosomes.

Which of the following is correct for the condition when plant YyRr is back crossed with the double recessive parent ?

A. $9:3:3:1$ ratio of phenotypes only

B. $9:3:3:1$ ratio of genotypes only

C. $1:1:1:1$ ratio of phenotypes only

D. $1:1:1:1$ ratio of phenotypes and genotypes

Answer: D

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45. When two pairs of traits are combined in a hybrid, segregation of one pair of characters is independent of the other pair of characters. The

statement explains which of the following laws/principles of Mendel ?

A. Principle of paired factors

B. Principle of dominance

C. Law of segregation

D. Law of independent assortment

Answer: D

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46. Law of independent assortment can be explained with the help of

A. dihybrid cross

B. test cross

C. back cross

D. monohybrid cross

Answer: A

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47. Mendel's work was rediscovered by three scientists in the year

A. 1865

B. 1900

C. 1910

D. 1920

Answer: D

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48. Which three scientists independently rediscovered Mendel's work ?

A. Avery, McLeod, McCarty

B. Sutton,Morgan and Bridges

C. Bateson, Punnet and Bridges

D. de Vries, Corren and Tschermak

Answer: B

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49. Chromosomal theory of inheritance was given by

A. Morgan et al

B. Sutton and Boveri

C. Hugo de Vries

D. Gregor J. Mendel

Answer: B

Watch Video Solution

50. Experimental verification of chromosomal theory of inheritance was done by

A. Sutton and Boveri

B. Morgan et al

C. Henking

D. Kari Correns

Answer: B

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51. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Multiple allelism	(i)	$Tt \times tt$
B.	Back cross	(ii)	$Tr \times TT$
C.	Test cross	(iii)	Human blood groups
D.	Crossing over	(iv)	Non-parental gene combination
E.	Recombination	(v)	Non-sister chromatids

A. A-(iii),B-(i),C-(ii),D-(v),E-(iv)

B. A-(iii),B-(ii),C-(i),D-(v),E-(iv)

C. A-(iii),B-(ii),C-(i),D-(iv),E-(v)

D. A-(iv),B-(ii),C-(i),D-(v),E-(iii)

Answer: B

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52. Genes located very close to one another on same chromosome tend to be transmitted together and are called as

A. allelomorphs

B. identical genes

C. linked genes

D. recessive genes

Answer: C

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53. True-breeding red-eyed Drosophila flies with plain thoraxes were crossred with pink-eyed flies with striped thoraxes

Red eye	$\times$	Pink eye
Plain thorx		striped throrax

The F_1 flies were then test crossed against the double recessive

The following F_2 generation resulted from the cross :

80	16	12	92
Red eye	Red eye	Pink eye	Pink eye
Plain thorax	Striped thorax	Plain thorax	Striped thorax

What percentage number of recombinats resulted from the test cross ?

A. 12

B. 14

C. 16

D. 28

Answer: B

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54. Depending upon the distance between any two genes which is inversely proportional to the strength of linkage, cross overs will vary from

A. $50 - 100\,\%$

B. $0 - 50\,\%$

C. $75 - 100\,\%$

D. $100 - 150\,\%$

Answer: B

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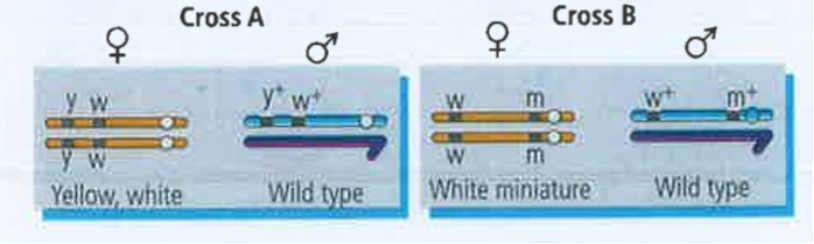
55. Refer to the given figure of cross A and cross B and select the correct statement regarding them



A. In cross A, the strength of linkage between genes y and w is higher than the cross B genes w and ,

B. In cross A, t he strength of linkage between genes y and w is less than the cross B genes w and m

C. Both cross A gnes y and w and cross B have the same strength of linkage

D. The percentage of recombinants produced in cross A is higher than cross B

Answer: A

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56. What is true about the crossing over between linked genes ?

A. No crossing over at all

B. High percentage of crossing over

C. Hardly any crossing over

D. none of these

Answer: C

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57. Chromosome maps/genetic maps were first prepared by

A. Sutton and Boveri (1902)

B. Bateson and punnett (1906)

C. Morgan (1910)

D. Sturtevant (1911)

Answer: D

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58. The distance between the genes is measured by

A. angstrom

B. map unit

C. Dobson unit

D. millimetre

Answer: B

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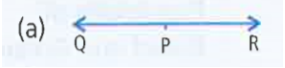
59. If map distance between genes P and Q is 4 units, between P and R is 11 units, and between Q and R is 7 units, the order of genes on the linkage map can be traced as follows

A. 

B. 

C. 

D. 

Answer: C

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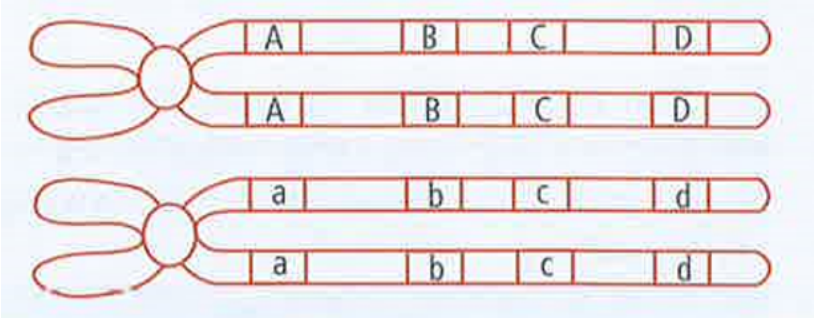
60. Given diagram shows a pair of homologous chromosomes during meiosis



Maximum crossing over will occur between genes

A. A and a,D and d

B. C and d, c and D

C. B and c, b and C

D. A and d, a and D

Answer: D

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61. Which of the following is suitable for experiment on linkage ?

A. aaBB $\times$ aaBB

B. AABB $\times$ aabb

C. AaBb $\times$ AaBb

D. AAbb $\times$ AaBB

Answer: B

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62. Mendel law of independent assortment does not hold true for the genes that are located closely on

A. same chromosome

B. non-homologous chromosomes

C. X-chromosome

D. autosomes

Answer: A

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63. If linkage was known at the time of Mendel then which of the following laws, he would not have been able to explain ?

A. Law of dominance

B. Law of independent assortment

C. Law of segregation

D. Law of purity of gametes

Answer: B

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64. In maize, coloured endosprem (C) is dominant over colourless (c) , and full endosperm (R) is dominant over shrunken (r). When a dihybrid of F_1 generation was test crossed, it produced four phenotypes in the following percentage :

Coloured full - 48 % Coloured shrunken - 5 %

Colourless full - 7 % Colourless shrunken - 40 %

From this data, what will be the distance between two non-allelic genes ?

A. 48 units

B. 5 units

C. 7 units

D. 12 units

Answer: D

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65. Which of the following are reasons for Mendel's success ?

(i) Usage of pure lines or pure breeding varieties

(ii) Consideration of one character at a time

(iii) Maintenance of statistical records of experiments

(iv) Knowledge of linkage and incomplete dominance

A. (i) and (ii) only

B. (i),(ii) and (iii)

C. (i) and (iv) only

D. (ii),(iii) and (iv)

Answer: B

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66. In polygenic inheritance

A. many genes govern a single character

B. heterozygous organisms express only one allele itself

C. heterozygous organisms express both alleles

D. a single gene influences many characters

Answer: A

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67. In a cross between negro and albino skin colour of humans showing polygenic inheritance, the phenotypic ratio in F_2 generation will be

A. $9:3:3:1$

B. $1:6:15:20:15:6:1$

C. $1:4:6:4:1$

D. $1:2:2:4:1:2:1:2:1$

Answer: B

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68. What proportion of the offsprings obtained from cross AABBCC $\times$ AaBbCc will be completely heterozygous for all the genes segregated independently ?

A. $1/8$

B. $1/4$

C. $1/2$

D. $1/16$

Answer: A

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69. Refer the given statements and select the correct option

(i) Percentage of homozygous dominant individuals obtained by selfing Aa individuals is 25 %

(ii) Types of genetically different gametes produce by genotype AABbcc are 2

(iii) Phenotypic ratio of monohybrid F_2 progeny in case of Mirabilis jalapa is $3:1$

A. All the statements are true

B. Statements (i) and (ii) are true, but statement (iii) is false

C. Statement (i) and (iii) are true, but statement (ii) is false

D. Statements (ii) and (iii) are true, but statement (i) is false

Answer: B

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70. A man having the genotype EEFfGgHH can produce P number of genetically different sperms, and a woman of genotype liLLMmNn can generate Q number of genetically different eggs. Determine the values P and Q.

a. P = 4, Q = 4

b. P = 4,Q = 8

c. P = 8, Q = 4

d. P = 8,Q = 8

A. P = 4, Q = 4

B. P = 4,Q = 8

C. P = 8, Q = 4

D. P = 8,Q = 8

Answer: B

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71. A pleiotropic gene:

1) controls a trait only in combination with another gene

2) controls multiple traits in an individual

3) is expressed only in primitive plants

4) is a gene evolved during Pliocene

A. controls a trait only n combination with another gene

B. controls multiple traits in an individual

C. is expressed only in primitive plants

D. is a gene evolved during Pliocene

Answer: B

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72. The gene disorder phenylketonuria is an example for

A. multiple allelism

B. polygenic inheritance

C. multiple factor

D. pleiotropy

Answer: D

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73. Genes with multiple phenotypic effects are known as

A. hypostatic genes

B. duplicate genes

C. pleiotropic genes

D. complementary genes

Answer: C

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74. When a single gene influences more then one trait it is called

A. pseudodominance

B. pleiotropy

C. epistasis

D. none of these

Answer: B

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75. Pleiotropic genes have

A. repressed phenotype

B. hidden phenotype

C. multiple phenotype

D. all of these

Answer: C

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76. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Gregor J, Mendel	(i)	Chromosomal theory of inheritance
B.	Sutton and Boveri	(ii)	Laws of inheritance
C.	Henking	(iii)	Drosophila
D.	Morgan	(iv)	Discovered X-body

A. A-(ii),B-(i),C-(iv),D-(iii)

B. A-(iv),B-(i),C-(ii),D-(iii)

C. A-(iv),B-(ii),C-(i),D-(iii)

D. A-(ii),B-(iii),C-(iv),D-(i)

Answer: A

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77. XO type of sex determination and XY type of sex determination are the examples of:

a. male heterogamety

b. female heterogamety

c. male homogamety

d. both (b) and (c)

A. male heterogamety

B. female heterogamety

C. male homogamety

D. both (b) and (c)

Answer: A

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78. In XO type of sex determination

A. females produce two different types of gametes

B. males produce two different types of gametes

C. females produce gametes with Y chromosome

D. males produce gametes with Y chromosome

Answer: B

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79. Which of the following is incorrect regarding ZW-ZZ type of sex determination ?

A. It occurs in birds and some reptiles

B. Females are homogametic and males are heterogametic

C. $1:1$ sex ratio is produced in the offsprings

D. all of these

Answer: B

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80. A couple has six daughters. What is the possibility of their having a girl next time ?

A. $10\ \%$

B. $50\ \%$

C. $90\ \%$

D. $100\ \%$

Answer: B

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81. Select the correct statements regarding honeybees

(i) The queen bee and the worker bees develop from fertilised eggs and are sexually females

(ii) Males (drones) develop parthenogenetically from unfertilised eggs

(iii) Queen bee feeds upon royal jelly and the worker bees feed upon bee bread.

A. (i) and (ii)

B. (ii) and (iii)

C. (i) and (iii)

D. (i),(ii) and (iii)

Answer: D

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82. Number of autosomes present in liver cells of a human female is:

a. 22 autosomes

b. 22 pairs

c. 23 autosomes

4. 23 pairs

A. 22 autosomes

B. 22 pairs

C. 23 autosomes

D. 23 pairs

Answer: B

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83. In honeybees, females are __(i)__ having __(ii)__ chromosomes and males are __(iii)__ having __(iv)__ chromosomes

A.

(i)	(ii)	(iii)	(iv)
diploid	46	haploid	23

B.

(i)	(ii)	(iii)	(iv)
haploid	23	diploid	46

C.

(i)	(ii)	(iii)	(iv)
diploid	23	haploid	16

D.

(i)	(ii)	(iii)	(iv)
haploid	23	diploid	32

Answer: C

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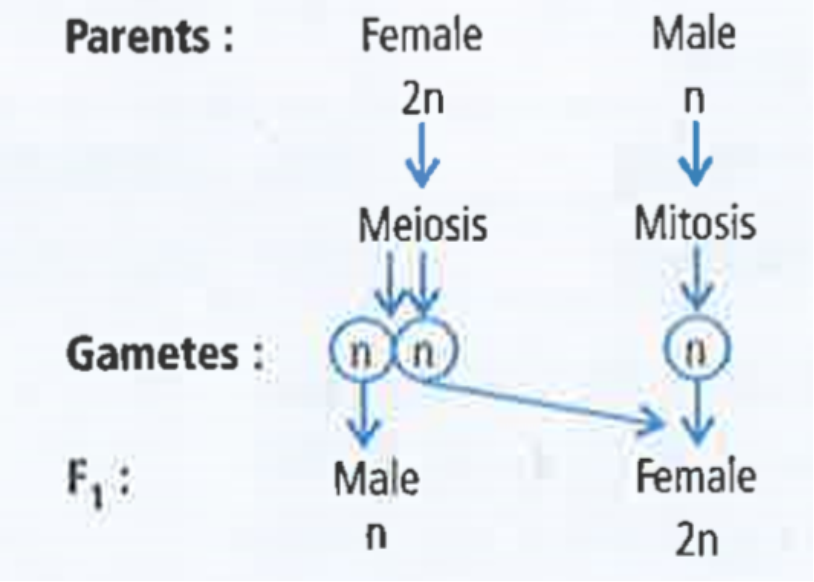
84. Refer to the given figure



This type of sex determination is found in

A. grasshoppers and cockroaches

B. birds and reptiles

C. butterflies and moths

D. honeybess, ants and wasps

Answer: D

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85. Rate of mutation is affected by:

1. temperature

2. X-rays

3. gamma rays

4. all of these

A. temperature

B. X-rays

C. gamma rays

D. all of these

Answer: D

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86. Insertion or deletion of a single base causes

A. inversion mutation

B. transition mutation

C. frame-shift mutation

D. transversion mutation

Answer: C

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87. Point mutation may occur due to

A. alteration in DNA sequence

B. change in a single base pair of DNA

C. deletion of a segment of DNA

D. gain of a segment in DNA

Answer: B

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88. Select the incorrect statement regarding pedigree analysis

A. Solid symbols show unaffected individuals

B. Proband is the person from which case history starts

C. It is useful for genetic counsellors

D. It is an alalysis of traits in several generations of a family

Answer: A

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89. Which one is the incorrect match ?

A. (a)  – Consanguineous mating

B. (b)  – Sex unspecified

C. (c)  – Male

D. (d) ■ ● – Affected individuals

Answer: C

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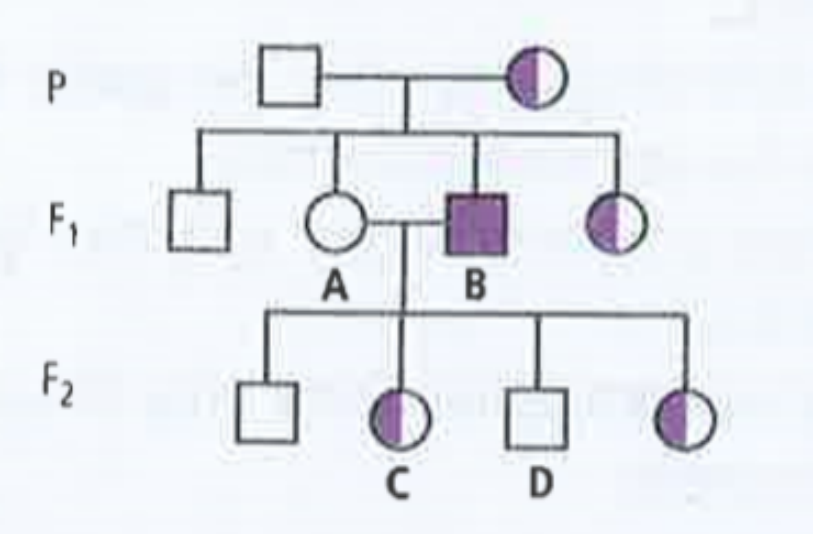
90. Study the given pedigree chart showing the inheritance if an X-linked trait controlled by gene 'r'



What will be the genotypes of individuals A,B,C and D respectively ?

A. XX, X^rY, X^rX, XY

B. X^rX^r, XY, XX, XY

C. $X^rX, X^rY^r, X^rX^r, X^rY$

D. XX, X^rY^r, XX, XY

Answer: A

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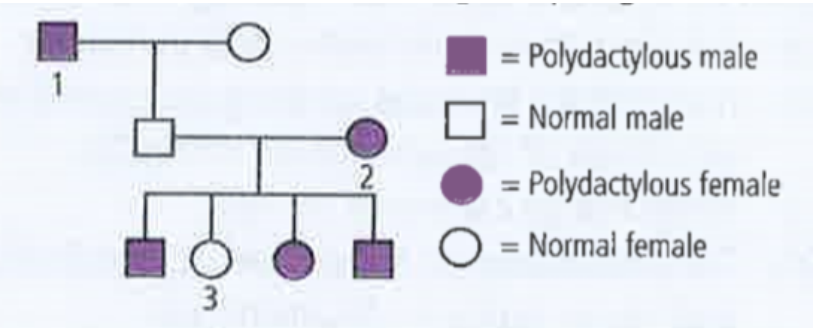
91. In humans polydactyly (i.e., presence of extra fingers and toes) is determined by a dominant autosomal allele (P) and the normal condition is determined by a recessive allele (p). Find out the possible genotypes of family members 1,2 and 3 in the given pedigree



A. 1 PP, 2 Pp, 3 pp

B. 1 PP, 2 PP, 3 pp

C.
1	2	3
Pp	PP	Pp

D.
1	2	3
Pp	Pp	pp

Answer: D

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92. Fused ear lobes appear in the progeny due to an autosomal recessive gene, Work out the genotypes of members in the given pedigree

A.
I-2	II-3	II-1
aa	Aa	Aa

B.
I-2	II-3	II-1
aa	AA	AA

C.
I-2	II-3	II-1
Aa	Aa	Aa

D.
I-2	II-3	II-1
aa	Aa	AA

Answer: A

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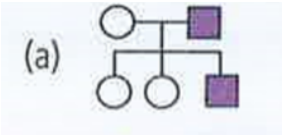
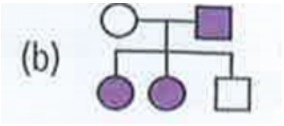
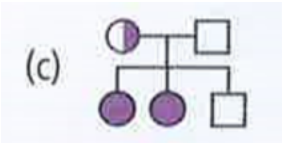
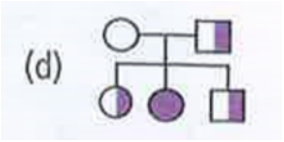
93. Wife is PTC non-taster and husband is PTC taster. Their son is taster but daughters are non-tasters. This is not a sex linked trait. Which pedigree is correct ?

A. 

B. 

C. 

D. 

Answer: A

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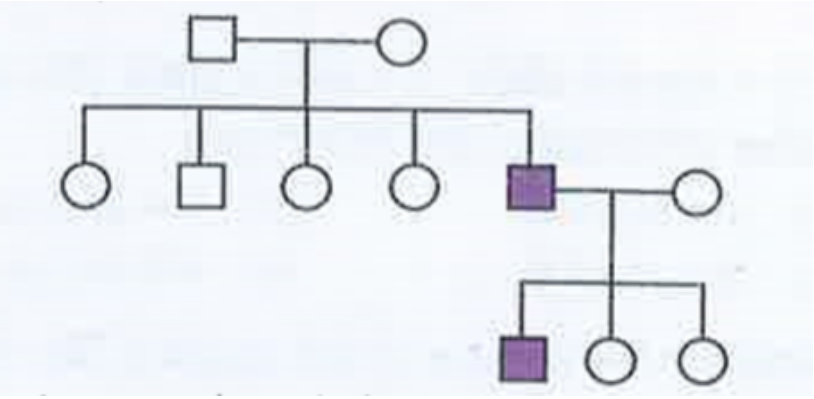
94. In the following pedigree chart, the mutant trait is shaded black. The gene responsible for the trait is



A. dominant and sex linked

B. dominant and autosomal

C. recessive and sex linked

D. recessive and autosomal

Answer: D

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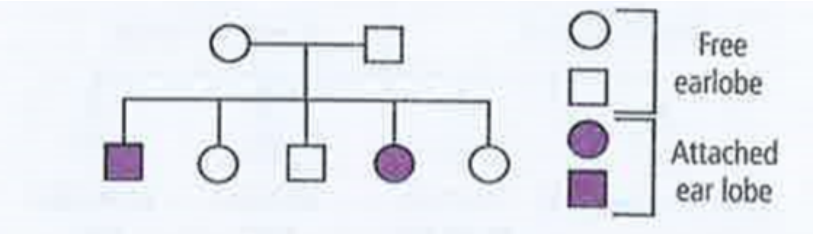
95. Given pedigree chart depicts the inheritance of attached ear lobes, an autosomal recessive trait



Which of the following conclusions drawn is correct ?

A. Parents are heterzygous

B. Parents are homozygous dominant

C. Parents are homozygous recessive

D. none of these

Answer: A

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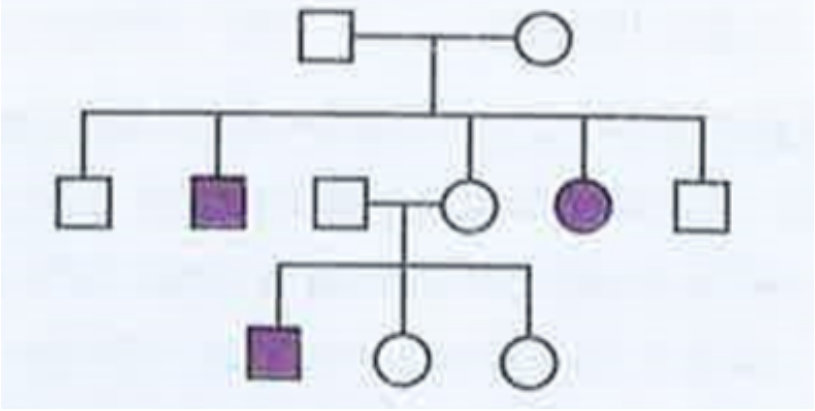
96. Study the pedigree chart of a family showing the inheritance of sickle-cell anaemia



The trait traced in the above pedigree chart is

A. dominant X-linked

B. recessive X-linked

C. autosomal dominant

D. autosomal recessive

Answer: D

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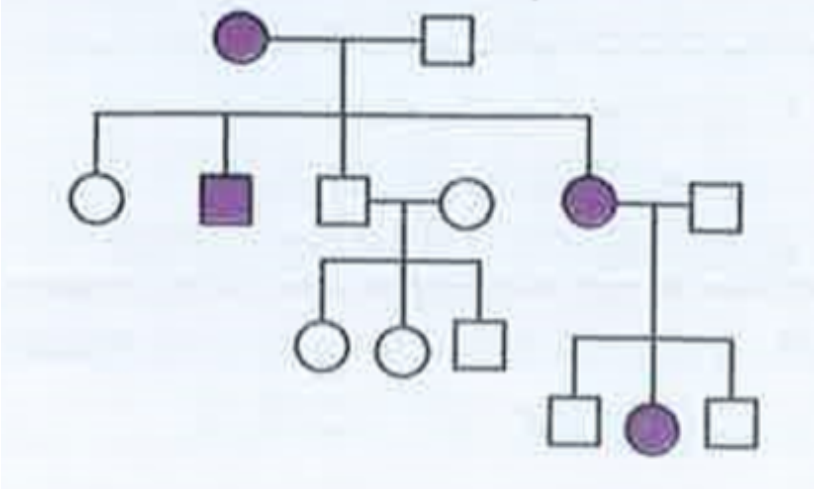
97. Study the pedigree chart of a family showing the inheritance of myotonic dsytrophy



The trait under study is

A. dominant X-linked

B. recessive X-linked

C. autosomal dominant

D. recessive Y-linked

Answer: C

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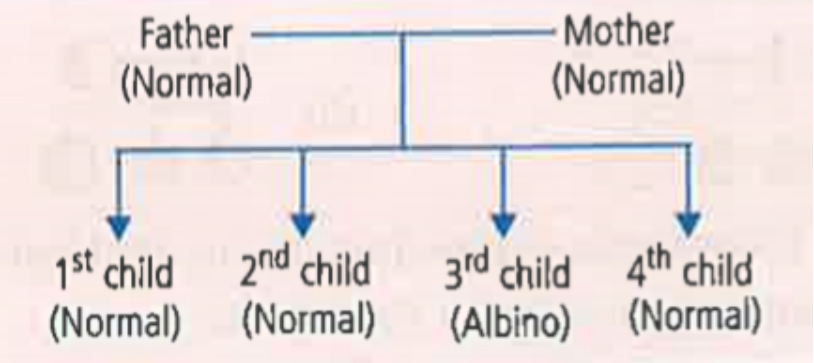
98. Refer to the given family tree and answer the question



If A= normal allele, a = albino allele, then genotypes of father and mother are respectively

A. Aa and Aa

B. AA and Aa

C. Aa and AA

D. Aa and aa

Answer: A

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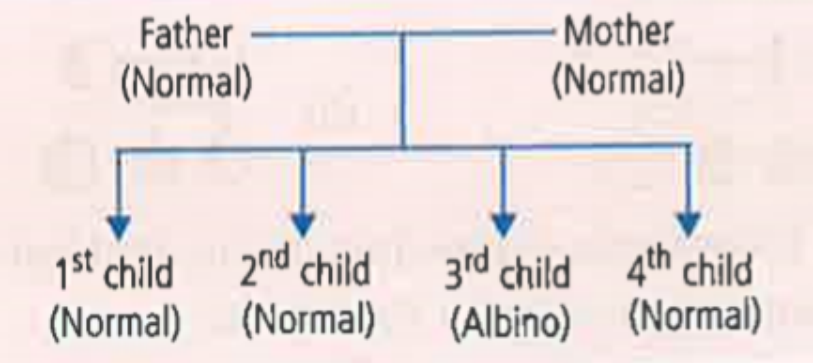
99. Refer to the given family tree and answer the question



What are the chances of this couple's fifth child being an albino ?

A. 1 in 1

B. 1 in 2

C. 1 in 3

D. 1 in 4

Answer: D

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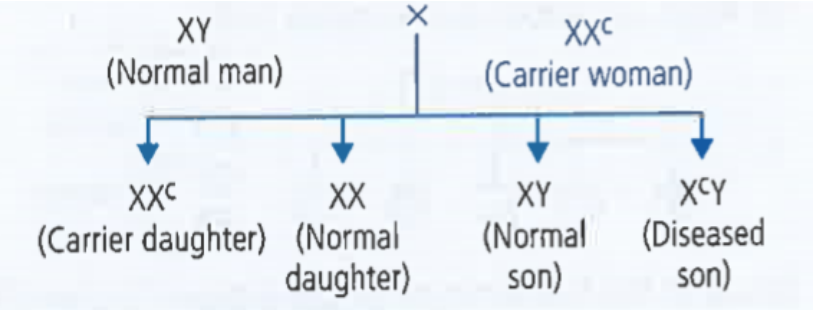
100. Inheritance of which of the following traits is shown in the given cross ?



A. X-linked dominant trait

B. X-linked recessive trait

C. autosomal recessive trait

D. Autosomal dominant trait

Answer: B

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101. _____ is an example of X-linked recessive trait

A. Phenylketonuria

B. Haemophilia

C. Cystic fibrosis

D. Sickle-cell anaemia

Answer: B

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102. If a haemophilic man marries a carrier woman than which of the following holds true for their progenies ?

A. 50 % daughters are carrier and 50 % are haemophilic

B. All the daughters are haemophilic

C. All sons are haemophilic and all daughters are normal

D. All sons normal, all daughters carriers

Answer: A

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103. The possibility of a female becoming haemophilic is extremely rare because mother of such a female has to be at least (i) and father should be (ii)

A. (i) haemophilic, (ii) carrier

B. (i) carrier, (ii) haemophilic

C. (i) haemophilic, (ii) normal

D. (i) haemophilic, (ii) haemophilic

Answer: B

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104. Result of a cross between a normal homozygous female and a haemophiliac male would be

A. normal males and normal females

B. haemophilic males and normal females

C. normal males and carrier females

D. haemophilic males and carrier females

Answer: C

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105. Father of a child is colourblind and mother is carrier for colourblindness, the probability of the child being colour blind is

A. $25\ \%$

B. $50\ \%$

C. $100\ \%$

D. $75\ \%$

Answer: B

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106. A coloured man (X^cY) marries a woman who is carrier for haemophilia (XX^h). Which of the following is true for their progenies ?

A. 25% female progenies carry the genes foe both haemophilia and colourblindness

B. 25% male progenies carry only the gene for haemophilia

C. 25% female progenies carry only the gene for colourblindness

D. all of these

Answer: D

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107. A marriage between a colourblind man and a normal woman produces

A. all carrier daughters and normal sons

B. $50\ \%$ carrier dauthters, $50\ \%$ normal daughters

C. $50\ \%$ colourblined sons, $50\ \%$ normal sons

D. all carrier offsprings

Answer: A

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108. Red green colourblindness is a sex linked trait. Which of the given statements is not correct regarding colourblindness ?

A. It is more common in males than in females

B. Homozygous recessive condition is required for the expression of colourblindness in females.

C. Males can be carriers of the trait

D. Colourblind women always have colourblind father and always produce colorblined son.

Answer: C

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109. The disease sickle-cell anaemia is caused by the substitution of (i) by (ii) at the (iii) position of (iv) globin chain of haemoglobin molecule

Which of the following correctly fills the blanks in the above statements ?

A. (i) valine, (ii) glutamic acid, (iii) sixth, (iv) beta

B. (i) glutamic acid, (ii) valine, (iii) sixth, (iv) beta

C. (i) glutamic acid, (ii) valine, (iii) fifth, (iv) beta

D. (i) valine,(ii) glutamic acid, (iii) fifth, (iv) beta

Answer: B

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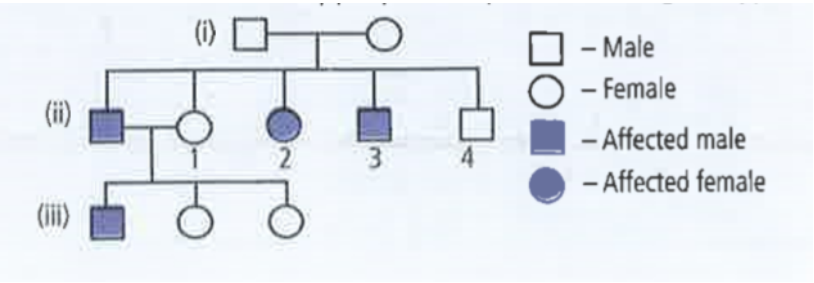
110. Study the given pedigree chart for sickle-cell anaemia and select the most appropriate option for the genotypes



A. Genotypes of parents Hb^AHb^S, Hb^AHb^A Genotypes of 1st and 3rd child in F_1 Hb^AHb^A, Hb^AHb^S

B. Genotypes of parents Hb^AHb^S, Hb^AHb^S Genotypes of 1st and 3rd child in F_1 Hb^AHb^A, Hb^AHb^A

C. Genotypes of parents Hb^AHb^A, Hb^AHb^S Genotypes of 1st and 3rd child in F_1 Hb^AHb^A, Hb^SHb^S

D. Genotypes of parents Hb^AHb^S, Hb^AHb^S Genotypes of 1st and 3rd child in F_1 Hb^AHb^S, Hb^SHb^S

Answer: D

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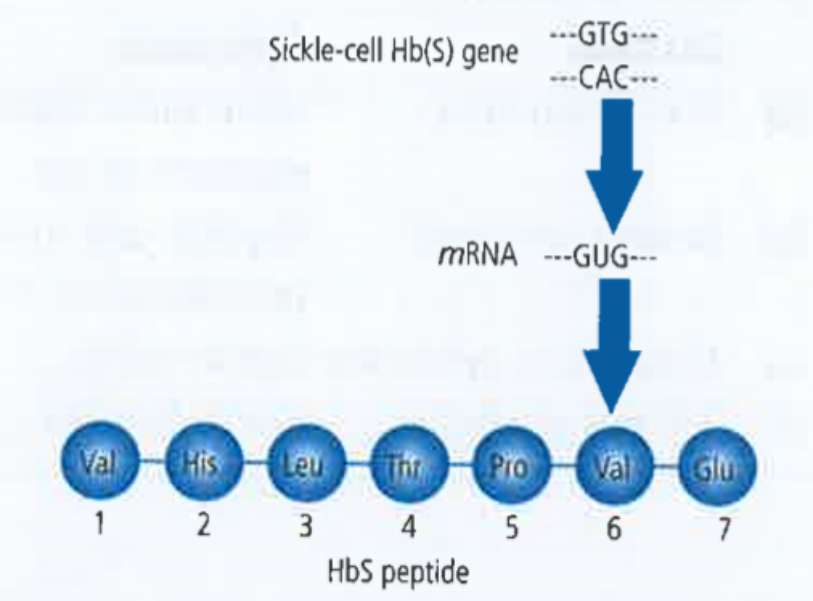
111. Refer to the give figure



The shape of RBCs under oxygen tension in the given situation becomes

A. beconcave disc like

B. elongated and curved

C. circular

D. spherical

Answer: B

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112. An individual affected by phenylketonuria lacks an enzyme that converts the amino acid _____ into _____

A. tyrosine, pheylalanine

B. phenylalanine, tyrosine

C. homogentisic acid, phenylalanine

D. homogentisc acid, tyrosine

Answer: B

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113. Which of the following is not a example of recessive autosomal disease ?

A. Haemophilia

B. Cystic fibrosis

C. Pheylketonuria

D. Sickle-cell anaemia

Answer: A

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114. If both parents are carriers for thalassaemia, which is an autosomal recessive disorder what are the chances of pregnancy resulting in an affected child ?

A. $25\ \%$

B. $100\ \%$

C. No chance

D. $50\ \%$

Answer: A

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115. Select the disease which is caused by recessive autosomal genes when present in homozygous condition

A. Alkaptonuria

B. Albinism

C. Crystic fibrosis

D. all of these

Answer: D

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116. In this disease, there occurs a failure of chloride ion transport mechanism in cell surface membrane of epithelial cells, Sweat of the patient contains very high level of Na^+ and Cl^- ions. The disease is

A. thalassaemia

B. Alzheimer's disease

C. Gaucher's disease

D. cystic fibrosis

Answer: D

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117. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Sickle cell anaemia	(i)	7th chromosome
B.	Pheylketonuria	(ii)	4th chromosome
C.	Cystic fibrosis	(iii)	11th chromosome
D.	Huntington's disease	(iv)	X-chromosome
E.	Colourblindness	(v)	12th chromosome

A. A-(iii),B-(v),C-(ii),D-(i),E-(iv)

B. A-(iii),B-(v),C-(i),D-(ii),E-(iv)

C. A-(v),B-(iv),C-(ii),D-(iii),E-(i)

D. A-(iv),B-(ii),C-(iii),D-(i),E-(v)

Answer: B

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118. Which of the following trait is controlled by dominant autosomal genes ?

A. Polydactyly

B. Huntington's chorea

C. PTC (phenylthiocarbamide) tasting

D. all of these

Answer: D

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119. Refer the given statements

(i) Incomplete or mosaic inheritance is an example of pre-Mendelian concept of blending inheritance

(ii) Test cross is a special type of back cross

(iii) Chromosomal aberrations are commonly observed in cancer cells

(iv) Thalassaemia is a Mendelian disorder

Which of the above statements are correct ?

A. (i) and (ii) only

B. (ii),(iii) and (iv)

C. (ii) and (iv) only

D. (i) and (iv) only

Answer: B

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120. Failure of segregation of chromatids during cell division results in the gain or loss of chromososmes, this is called as

A. euploidy

B. monoploidy

C. aneuploidy

D. polyploidy

Answer: C

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121. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Autopolyploidy	(i)	2n+1
B.	Trisomy	(ii)	AAAA
C.	Allopolyploidy	(iii)	AABB
D.	Nullisomy	(iv)	2n-2

A. A-(ii),B-(i),C-(iii),D-(iv)

B. A-(iv),B-(i),C-(ii),D-(iii)

C. A-(ii),B-(iv),C-(iii),D-(i)

D. A-(ii),B-(i),C-(iv),D-(iii)

Answer: A

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122. Failure of cytokinesis after telophase stage of cell division results in an increase in a whole set of chromosomes in an organism. The phenomenon is called as

A. polyploidy

B. aneuploidy

C. haploidy

D. diploidy

Answer: A

Watch Video Solution

123. Match column I with colimn II and select the correct option from the given codes

	Column I		Column II
A.	Autosomal recessive trait	(i)	Down's syndrome or mo
B.	Sex-linked rec essive trait	(ii)	Pheylketonuria
C.	Metabolic erorr lined to autosomal recessive trait	(iii)	Haemophilia
D.	Additional 22st chromosome anaemia	(iv)	Sickle cell

A. A-(ii),B-(i),C-(iv),D-(iii)

B. A-(iv),B-(i),C-(ii),D-(iii)

C. A-(iv),B-(iii),C-(ii),D-(i)

D. A-(iii),B-(iv),C-(i),D-(ii)

Answer: C

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124. Klinefelter's syndrome is characterised by a karyotype of

A. XYY

B. XO

C. XXX

D. XXY

Answer: D

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125. Which of the following is mismatched pair of disease and its related symptom ?

A.

Disease	Symptom
Phenylketonuria	Urine turns black on exposure to air

B.

Disease	Symptom
Down's syndrome	Physical and mental retardation

C.

Disease	Symptom
Klinefelter's syndrome	Sterile males

D.

Disease	Symptom
Turner's syndrome	Sterile females

Answer: A

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126. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Turner's syndrome	(i)	Trisomy
B.	Linkage	(ii	$AA + XO$
C.	Y-chromosome	(iii)	Morgan
D.	Down's syndrome	(iv)	TDF

A. A-(ii),B-(i),C-(iv),D-(iii)

B. A-(iv),B-(i),C-(ii),D-(iii)

C. A-(iv),B-(ii),C-(i),D-(iii)

D. A-(ii),B-(iii),C-(iv),D-(i)

Answer: D

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127. Due to nondisjunction of chromosomes during spermatogensis, some sperms carry both sex chromosomes (22A + XY) and some sperms do not carry any sex chromosome (22A + O). If these sperms fertilise normal eggs (22A + X), what types of genetic disorders respectively appear among the offspring ?

A. Klinefelter's syndrome and Turner's syndrome

B. Turner's syndrome and Klinefelter's syndrome

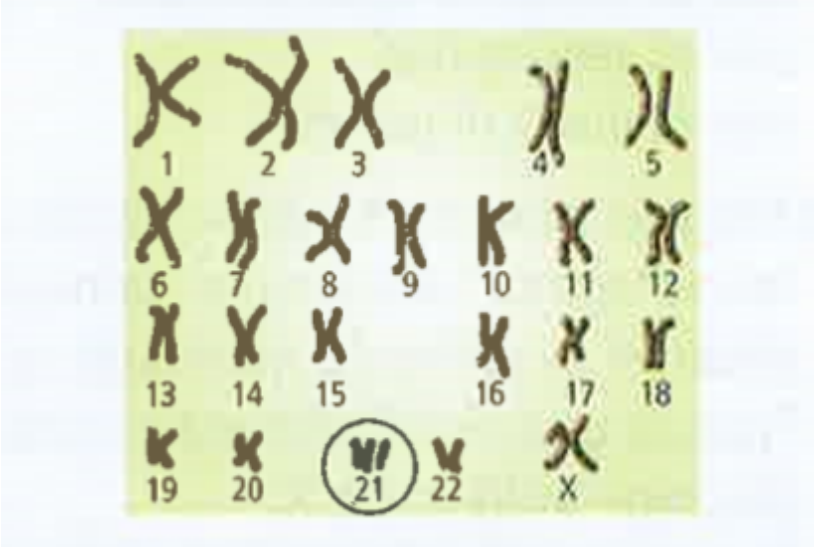
C. Down's syndrome and Turner's syndrome

D. Down's syndrome and cri-du-chat syndrome

Answer: A

Watch Video Solution

128. Refer to the given figure representing karyotype of individual who inflicted with this chromosomal disorder



Select the correct statement regarding them.

A. This disorder occurs due to failure of segregation of chromatids during cell division cycle results in the gain of chromosome

B. This disorder occurs due to failure of cytokinesis after telophase stage of cell division results in an increases in whole set of chromosome

C. Individuals inflicted with this disorder are usually sterile

D. Both (a) and (c)

Answer: A

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129. Find out the mismatched pair

A. Haemophilia - Sex linked recessive

B. Cystic fibrosis - Autosomal recessive

C. Down's syndrome - Trysomy 21

D. Turner's syndrome - Y-linked

Answer: D

Watch Video Solution

130. Match column I with column II and select the correct option from the given codes

	Column I		Column II
A.	Chromosomal aberration	(i)	An additional sex chromosome
B.	Down' syndrome	(ii)	Inversion
C.	Klinefelter's syndrome	(iii)	Presence of an extra chromosome
D.	Turner's syndrome	(iv)	absence of sex chromosome

A. A-(ii),B-(iv),C-(i),D-(iii)

B. A-(ii),B-(iv),C-(iii),D-(i)

C. A-(ii),B-(iii),C-(i),D-(iv)

D. A-(iii),B-(iv),C-(i),D-(ii)

Answer: C

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131. In human, attached earlobes are a dominant feature over free earlobes while hypertrichosis (Y-linked) feature. A man with attached earlobed and extensive hair on pinna married a woman having free earlobes. The couple had one son with free earlobes and hairy pinna and two daughters with attached earlobes. One of the daughters with attached earlobes. One of he daughters married a man with free earlobes and sparse hair on pinna. They had two sons. What would be the characteristics of their ponnae ?

A. Both will have attached earlobes and sparse hair on pinna

B. There would be equal chances foe both having free or attached earlobes and sparse hair on pinnae

C. They would have hairy pinnae and there would be 1 and 8 chance that both will have attached earlobes

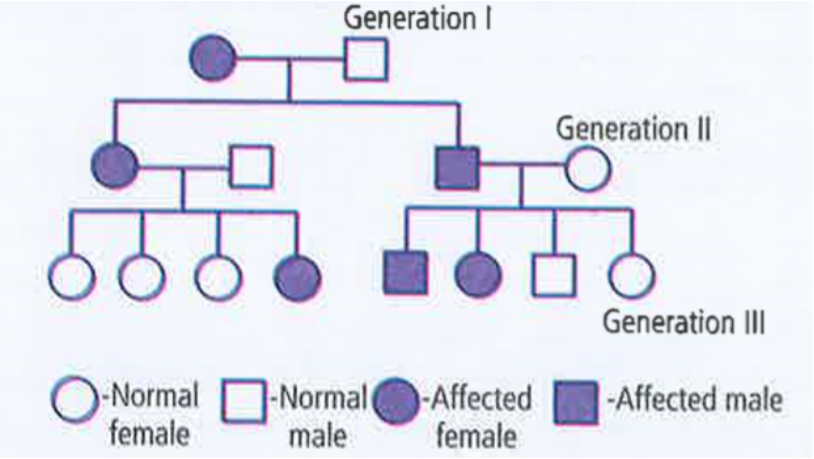
D. Both will have free earlobes and extensive hair on pinnae.

Answer: B

View Text Solution

132. A pedigree is shown below for a disease that is autosomal dominant.

What would be the genetic make up of the first generation ?



A. AA,Aa

B. Aa,aa

C. Aa,AA

D. Aa,Aa

Answer: B

View Text Solution

133. Study the two cases carefully, What would be the correct interpretation of the two cases ?

Case	Mother	Father	Children
Case I	With disease	Normal	Sons always with disease
Case II	With disease	Normal	Sons and daughters could show disease

A. Case I : X-linked recessive disease
Case II : Autosomal recessive disease

B. Case I : Y-linked recessive disease
Case II : X-linked recessive disease

C. Case I and II : X-linked recessive disease

D. Case I : Y-linked dominant disease
Case II : Autosomal dominant disease

Answer: A

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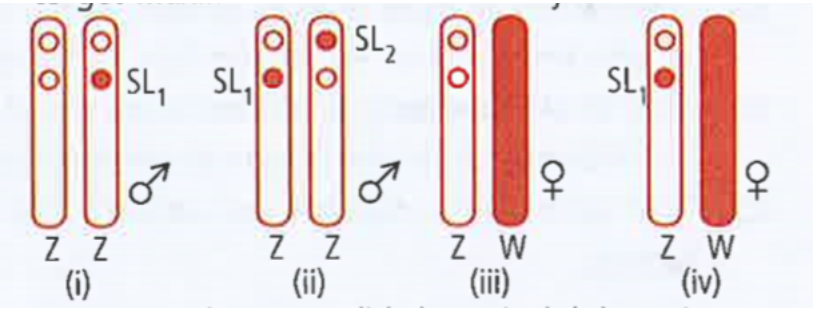
134. Males of silkworm Bombyx more are known to produce more silk per unit quantity of leaf consumed. Hence, they are preferably bred in sericulture industry. Which of the following genotypes should be crossed in order to get maximum fraction of male insects ?



Note : SL_1 and SL_2 are sex-linked recessive lethal mutations

A. (i) and (iv)

B. (i) and (iii)

C. (ii) and (iii)

D. (ii) and (iv)

Answer: B

View Text Solution

135. The allele for pea comb (P) in chickens is completely dominant to the allele for single comb (p) . The alleles for black feather colour (B), and white feather colour (B') show codominance, so that BB' individuals possess blue feathers. If chickens heterozygous for both pairs of genes are mated what proportion of offspring are expected to be pea combed and white feathered ?

A. $9/16$

B. $3/16$

C. $1/16$

D. $2/16$

Answer: C

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136. All gens located on the same chromosome

A. form different groups depending upon their relative distance

B. form one linkage group

C. will not from any linkage groups

D. from interactive groups that affect the phenotype

Answer: B

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137. Conditions of a karyotype $2n \pm 1 \text{ and } 2n \pm 2$ are called

A. aneuploidy

B. polyploidy

C. allopolyploidy

D. monosomy

Answer: A

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138. Distance between the genes and percentage of recombination shows

A. a direct relationship

B. an inverse relationship

C. a parallel relationship

D. no relationship

Answer: A

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139. If a genetic disease is transferred from a phenotypically normal but carrier female to only some of the male progeny, the disease is

A. autosomal dominant

B. autosomal recessive

C. sex-linked dominant

D. sex-linked recessive

Answer: D

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140. In sickle cell anaemia glutamic acid is replaced by valine Which one of the following triplets codes for valine ?

A. G G G

B. A A G

C. G A A

D. G U G

Answer: D

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141. Person having genotype $I^A I^B$ would show the blood group as AB. Thus is because of

A. pleiotropy

B. co-dominance

C. segregation

D. incomplete dominance

Answer: B

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142. ZZ/ZW type of sex determination is seen in

A. platypus

B. snails

C. cockroach

D. peacock

Answer: D

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143. A cross between two tall plants resulted in offspring having few dwarf plants. What would be the genotypes of both the plants ?

A. TT and Tt

B. Tt and Tt

C. TT and TT

D. Tt and tt

Answer: B

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144. In a dihybrid crossm if you get $9:3:3:1$ ratio it denotes that

A. the alleles of two genes are interacting with each other

B. it is a multigenic inheritance

C. it is a case of multiple allelism

D. the alleles of two genes are segregating independently

Answer: D

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145. Which of the following will not result in variations among siblings ?

A. Independent assortment of genes

B. Crossing over

C. Linkage

D. Mutation

Answer: C

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146. Mendel's law of independent assortment holds good for genes situated on the

A. non-homologous chromosomes

B. homologous chromosomes

C. extra nuclear genetic element

D. same chromosome

Answer: B

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147. Occasionally, a single gene may express more than one effect. The phenomenon is called

A. multiple allelism

B. mosaicism

C. pleiotropy

D. polygeny

Answer: C

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148. In a certain taxon of insects some have 17 chromosomes and the others have 18 chromosomes. The 17 and 18 chromosome-bearing organisms are

A. males and females, respectively

B. females and males,respectively

C. all males

D. all females

Answer: A

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149. The inheritance pattern of a gene over generations amoung human is studied by the pedigree analysis. Character studied in the pedigree analysis is equivalent to

A. quantitative trait

B. Mendelian trait

C. polygenic trait

D. maternal trait

Answer: B

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150. It is said that Mendel proposed that the factor controlling any character is discrete and independent. His proposition was based on the

A. results of F_3 generation of a cross

B. observations that the offsprings of a cross made between the plants having two contrasting characters shows only one character without any blending

C. self pollination of F_1 offsprings

D. cross pollination of F_1 generation with recessive parent.

Answer: B

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151. In the F_2 generation a Mendelian dihybrid cross, the number of phenotypes and genotypes are

A. phenotypes-2 , genotypes -16

B. phenotypes-9 , genotypes -4

C. phenotypes-4 , genotypes -8

D. phenotypes-4 , genotypes -9

Answer: D

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152. Mother and father of a person with 'O' blood group have 'A' and 'B' blood group respectively. What would be the genotype of both mother and father ?

A. Mother is homozygous for 'A' blood groups and father is heterozygous for 'B'

B. Mother is heterozygous for 'A' blood group and father is homozygous for 'B'

C. Both mother and father are heterozygous for 'A' and 'B' blood group, respectively.

D. Both mother and father are homozygous for 'A' and 'B' blood group respectively.

Answer: C

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153. Assertion : Mendel conducted artificial pollination experiments for his genetic studies using true-breeding pea lines

Reason : A true-breeding line shows the stable trait inheritance and expression for several generations

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154. Assertion : At F_2 stage in monohybrid cross, both parental traits are expressed in the proportion of $3:1$

Reason : The contrasting parental traits show blending at F_2 stage

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155. Assertion : Test cross is the cross between the F_1 progeny and either of the parenty types

Reason : Back cross is rhe cross between F_1 progeny and the double recessive genotype

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156. Assertion : The pink coloured flowers appear in F_2 generation of plant Mirabilis jalapa

Reason : This is observed due epistatic suppression of white colour alleles in one of parental flowers by red colour alleles

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157. Assertion : ABO blood group system provides a good example of multiple alleles

Reason : In ABO blood group system, when I^A and I^B alleles are present

together, they both express their own types option1 Both Asseration and Reason are correct

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158. Assertion : Pairing and separation of pair of chromosomes would lead to segregation of a pair of factors they carried

Reason : Two alleles of a gene pair are located on similar sites on non-homologous chromosomes

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159. Assertion : The law of independent assortment can be studied by means of dihybrid cross

Reason : The law of independent assortment is applicable only to linked genes

A. A and R both correct and R is correct explanation of A

B. A and R both are correct but R is not correct explanation of A

C. A is true but R is false

D. Both are false

Answer: C

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160. Assertion : When yelow bodied, white eyed Drosophila females were hybridised with brown-bodied, red eyeed males , and F_1 progeny was intercrossed, F_2 ratio deviated from $9:3:3:1$

Reason : When two genes in a dihybrid are on same chromosome, the proportion of parental gene combinations are much higher than the non-parental type

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161. Assertion : The maxiumum frequency of recombination, that can result from crossing over between linked genes is 50 percent

Reason : Linked genes shown higher frequency of crossing over if distance between them is longer.

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162. Assertion : In pigeons, females are heterogametic and males are homogametic

Reason : In pigeons, females have ZW sex chromosomes and males have ZZ sex chromosomes.

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163. Assertion : Females, homozygous for genes on the X chromosomes do not express a trait more markedly than do hemizygous males

Reason: Dosage compensation mechanism accounts for effective dosage genes in males and females.

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164. Assertion : Variety of fruit colours in Cucurbita pepo is result of recessive epistasis

Reason : In recessive epistatsis, a recessive gene at one locus engances the expression of another gene, at a diferent locus.

A. A is true and R is true and R is correct explanation of A

B. A and R both are true and R is not correct explanation of A

C. A is true but R is false

D. Both are false

Answer: D

View Text Solution

165. Assertion : Sickle-cell anaemia is an autosome-linked recessive disorder that can be transmitted if both parents are heterozygous for the gene

Reason : In sickle-cell anaemia, haemoglobin molecule undergoes

polymerisation under low oxygen tension causing the change in shape in RBC

A. A and R both are correct and R is correct explanation of A

B. A and R both are correct and R is not correct explanation of A

C. A is correct but R is incorrect

D. A and R both are incorrect

Answer: B

View Text Solution

166. Assertion : Phenylpyruvic acid is excreted through urine in case of phenylketonuria

Reason : The affected individual lacks enzyme phenylalanine hydroxylase.

A. Both A and R are correct and R is correct explanation of A

B. Both A and R are correct but R is not the correct explanation of A

C. A is correct but R is incorrect

D. Both A and R are incorrect

Answer: A

View Text Solution

167. Assertion : Turner's syndrome is caused due to absence of any one of the X and Y sex chromosome

Reason : Such individuals show masculine as well as feminine development.

A. A and R both are correct and R is correct explanation of A

B. A and R both are correct and R is not the correct explanation of A

C. A is correct and R is incorrect

D. A and R both are incorrect

Answer: D

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