Principles of Inheritance and Variation

Question1

Given below are two statements:

Statement I: When many alleles of a single gene govern a character, it is called polygenic inheritance.

Statement II: In Polygenic inheritance, the effect of each allele is additive.

In the light of the above statements, choose the correct answer from the options given below.

[NEET 2024 Re]

Options:

A.

Statement I is true but Statement II is false

B.

Statement I is false but Statement II is true

C.

Both Statement I and Statement II are true

D.

Both Statement I and Statement II are false

Answer: B

Solution:

Polygenic inheritance refers to the inheritance of a trait governed by more than one gene.

In a polygenic trait the phenotype reflects the contribution of each allele i.e., the effect of each allele is additive.

Hence, statement I is incorrect and statement II is correct.

Question2

Match List-I with List-II:

	List-I		List-II Example

	Type of Inheritance		
A.	Incomplete dominance	I	Blood groups in human
B.	Co-dominance	II	Flower colour in Antirrhinum
C.	Pleiotropy	III	. Skin colour in human
D.	Polygenic inheritance	IV	Phenylketonuria

Choose the correct answer from the options given below:

[NEET 2024 Re]

Options:

A.

A-III, B-IV, C-II, D-I

B.

A-II, B-I, C-IV, D-III

C.

A-II, B-III, C-I, D-IV

D.

A-IV, B-I, C-III, D-II

Answer: B

Solution:

• Flower colour in Antirrhinum is a good example of incomplete dominance.

• Blood group in humans is an example of co-dominance where F_1 generation resembles both the parents.

• Phenylketonuria is an example of Pleiotropy.

• Skin colour in human shows polygenic inheritance.

Hence, A-II, B-I, C-IV, D-III is correct.

Question3

When a tall pea plant with round seeds was selfed, it produced the progeny of :
(a) Tall plants with round seeds and
(b) Tall plants with wrinkled seeds.

Identify the genotype of the parent plant.

[NEET 2024 Re]

Options:

A.

TtRr

B.

TtRR

C.

TTRR

D.

TTRr

Answer: D

Solution:

As per the type of given progeny the genotype of the parent will be TTRr.

Selfing = ♀ TTRr × ♂ TTRr

♂/♀	TR	Tr
TR	TTRR	TTRr
Tr	TTRr	TTrr

(F_1 generation)

According to the above cross progeny will be Tall round and Tall wrinkle.

Question4

Aneuploidy is a chromosomal disorder where chromosome number is not the exact copy of its haploid set of chromosomes, due to :
A. Substitution
B. Addition
C. Deletion
D. Translocation
E. Inversion

Choose the most appropriate answer from the options given below :

[NEET 2024 Re]

Options:

A.

C and D only

B.

D and E only

C.

A and B only

D.

B and C only

Answer: D

Solution:

Failure of segregation of chromatids during cell division-cycle results in the gain or loss of chromosome called aneuploidy.

Aneuploidy occurs due to addition or deletion.

Hence only (B) and (C) are correct

Question5

The mother has A+ blood group the father has B+ and the child is A+. What can be the possibility of genotypes of all three, respectively?

A. $I^AI^A \mid I^Bi \mid I^Bi$

B. $I^AI^A \mid I^Bi \mid I^Ai$

C. $I^Bi \mid I^AI^A \mid I^AI^B$

D. $I^AI^A \mid I^BI^B \mid I^Ai$

E. $I^Ai \mid I^Bi \mid I^Ai$

Choose the correct answer from the option given below:

[NEET 2024 Re]

Options:

A.

C and D

B.

D and A

C.

A and B

D.

B and E

Answer: D

Solution:

The child blood group is (A^+) that means he must have received (i) allele from the father i.e. the father genotype is (I^Bi).

While mother can have I^AI^A or IAi genotype.

So, the possible genotypes of all three i.e. mother, father and child respectively would be either

B. $I^AI^A \mid I^Bi \mid I^Ai$

E. $I^Ai \mid I^Bi \mid I^Ai$

Question6

Which one of the following can be explained on the basis of Mendel's Law of Dominance?
A. Out of one pair of factors one is dominant and the other is recessive.
B. Alleles do not show any expression and both the characters appear as such in F_2 generation.
C. Factors occur in pairs in normal diploid plants.
D. The discrete unit controlling a particular character is called factor.
E. The expression of only one of the parental characters is found in a monohybrid cross.

Choose the correct answer from the options given below:

[NEET 2024]

Options:

A.

A, B and C only

B.

A, C, D and E only

C.

B, C and D only

D.

A, B, C, D and E

Answer: B

Solution:

According to Law of Dominance
(1) Characters are controlled by discrete units called factors
(2) Factors occur in pairs
(3) In a dissimilar pair of factors one member of the pair dominates (dominant) the other recessive

The law of dominance is used to explain the expression of only one of the parental characters in a monohybrid cross.

Law of segregation is based on the fact that the alleles do not show any expression and both the characters are recovered as such in F_2 generation.

Question7

A pink flowered Snapdragon plant was crossed with a red flowered Snapdragon plant. What type of phenotype/s is/are expected in the progeny?

[NEET 2024]

Options:

A.

Only red flowered plants

B.

Red flowered as well as pink flowered plants

C.

Only pink flowered plants

D.

Red, Pink as well as white flowered plants

Answer: B

Solution:

Pink colour flower in snapdragon have genotype Rr

Red flowered snapdragon have genotype RR when they both are crossed

♂ / ♀	R	R
R	RR	RR
r	Rr	Rr

Phenotype

Red : Pink : White

2 2 0

So the progeny that we get are red and pink flowered plants only.

Question8

In a plant, black seed color (BB/Bb) is dominant over white seed color (bb). In order to find out the genotype of the black seed plant, with which of the following genotype will you cross it?

[NEET 2024]

Options:

A.

BB

B.

bb

C.

Bb

D.

BB/Bb

Answer: B

Solution:

To determine the genotype of a black seed colour at F_2, the black seed from F_2 is crossed with the white seed colour. This is called a test cross.

∴ To determine the genotype of (BB/Bb) black seed we need to cross them with white seed i.e. bb.

Question9

Match List I with List II

	List-I		List-II
A.	Two or more alternative forms of a gene	I.	Back cross
B.	Cross of F1 progeny with homozygous recessive parent	II.	Ploidy
C.	Cross of F1 progeny with any of the parents	III.	Allele
D.	Number of chromosome sets in plant	IV.	Test cross

Choose the correct answer from the options given below:

[NEET 2024]

Options:

A.

A-I, B-II, C-III, D-IV

B.

A-II, B-I, C-III, D-IV

C.

A-III, B-IV, C-I, D-II

D.

A-IV, B-III, C-II, D-I

Answer: C

Solution:

A. Two or more alternative forms of gene are called alleles.

B. Cross of F_1 progeny with homozygous recessive parent is a test cross.

C. Cross of F_1 progeny with any of the parents is a back cross.

D. Number of chromosome sets in plant is called ploidy.

Question10

As per ABO blood grouping system, the blood group of father is B^+ , mother is A^+ and child is O* . Their respective genotype can be

A. $I^Bi/I^Ai/ii$

B. $I^BI^B/I^AI^A/ii$

C. $I^AI^B/iI^A/I^Bi$

D. $I^Ai/I^Bi/I^Ai$

E. $iI^B/iI^A/I^AI^B$

Choose the most appropriate answer from the options given below :

[NEET 2024]

Options:

A.

A only

B.

B only

C.

C & B only

D.

D & E only

Answer: A

Solution:

Genotype of father with blood group $B^+ = I^Bi/iI^B$

Genotype of mother with blood group $A^+ = I^Ai/iI^A$

Genotype of child with blood group $O^+ =$ ii

Hence only ' A ' is correct.

Question11

	List - I		List - II
(A)	Monohybrid Cross	(I)	1 : 1
(B)	Dihybrid Cross	(II)	1 : 2 : 1
(C)	Incomplete dominance	(III)	3 : 1
(D)	Test Cross	(IV)	9 : 3 : 3 : 1

Choose the correct answer from the options given below : [NEET 2023 mpr]

Options:

A.

(A)-(III), (B)-(IV), (C)-(II), (D)-(I)

B.

(A)-(II), (B)-(IV), (C)-(III), (D)-(I)

C.

(A)-(II), (B)-(III), (C)-(IV), (D)-(I)

D.

(A)-(IV), (B)-(III), (C)-(I), (D)-(II)

Answer: A

Solution:

Solution:

(A) Monohybrid Cross : Monohybrid crosses are those that involve one pair of contrasting traits. In monohybrid crosses, the phenotypic ratio of the F2 generation is typically 3:1 (III).

(B) Dihybrid Cross : Dihybrid crosses are those that involve two pairs of contrasting traits. In dihybrid crosses, the phenotypic ratio of the F2 generation is typically 9:3:3:1 (IV).

(C) Incomplete Dominance : Incomplete dominance is when neither allele for a specific trait is dominant over the other. As a result, the phenotype of the heterozygote is somewhere in between the two homozygotes. The phenotypic ratio in such a case is typically 1:2:1 (II).

(D) Test Cross : A test cross involves crossing an individual exhibiting the dominant phenotype (but unknown genotype) with a homozygous recessive individual. The phenotypic ratio can be 1:1 (I) if the dominant individual was a heterozygote. If the dominant individual was a homozygote, all offspring will exhibit the dominant phenotype.

Question12

A heterozygous pea plant with violet flowers was crossed with homozygous pea plant with white flower. Violet is dominant over white. Which one of the following represents the expected combinations among 40 progenies formed?

[NEET 2023 mpr]

Options:

A.

30 produced violet and 10 produced white flowers

B.

20 produced violet and 20 produced white flowers

C.

All 40 produced violet flowers

D.

All 40 produced white flowers

Answer: B

Solution:

Solution:

The phenotype of the heterozygous pea plant with violet flowers is Vv (V for dominant violet allele and v for recessive white allele). The phenotype of the homozygous pea plant with white flowers is vv. This is a monohybrid cross.
When we create a Punnett square for this cross, we have :

	V	v
v	Vv (violet)	vv (white)
v	Vv (violet)	vv (white)

The Punnett square shows us that in this cross, half of the progeny will be heterozygous (Vv) with violet flowers (dominant trait), and the other half will be homozygous recessive (vv) with white flowers. Therefore, out of 40 progeny, we expect 20to have violet flowers and 20 to have white flowers.

Question13

In which disorder change of single base pair in the gene for beta globin chain results in change of glutamic acid to valine?

[NEET 2023 mpr]

Options:

A.

Thalassemia

B.

Sickle cell anemia

C.

Haemophilia

D.

Phenylketonuria

Answer: B

Solution:

Sickle cell anemia is caused by a single nucleotide mutation in the beta-globin gene, which is a part of hemoglobin. This mutation causes the amino acid glutamic acid to be replaced by valine at the sixth position of the beta-globin chain. The resulting hemoglobin, called hemoglobin S, can deform red blood cells into a sickle shape, especially under low oxygen conditions. This change can cause various complications including pain, anemia, and increased risk of infection.

The other disorders listed - Thalassemia, Haemophilia, and Phenylketonuria - are also genetic disorders, but they are caused by different mutations.

Question14

A certain plant homozygous for yellow seeds and red flowers was crossed with a plant homozygous for green seeds and white flowers. The F_1 plants had yellow seeds and pink flowers. The F_1 plants were selfed to get F_2 progeny. Assuming independent assortment of the two characters, how many phenotypic categories are expected for these characters in the F_2 generation?

[NEET 2023 mpr]

Options:

A.

9

B.

16

C.

4

D.

6

Answer: D

Solution:

Solution:

Parent generation (P) :
One parent is homozygous for yellow seeds (dominant trait, represented by 'YY') and red flowers (dominant trait, represented by 'RR'). Therefore, this parent's genotype is YYRR.
The other parent is homozygous for green seeds (recessive trait, represented by 'yy') and white flowers (recessive trait, represented by 'rr'). Therefore, this parent's genotype is yyrr.

First filial generation (F_1) :
When these two parents cross, all of the offspring in the F_1 generation will inherit one allele from each parent for both

traits, leading to a genotype of YyRr. This genotype results in a phenotype of yellow seeds and pink flowers (as red is incompletely dominant over white, resulting in pink when both are present).

Second filial generation (F_2) :
Now, when these F_1 generation plants self-fertilize, we can get a range of genotypes. This is due to the law of independent assortment which states that the alleles for yellow/green seeds and the alleles for red/pink/white flowers will sort independently of each other into the gametes.

For each trait, the F_1 parent can produce four types of gametes (YR, Yr,yR,yr). The Punnett square method can be used to find out the different combinations of these gametes. However, many of these combinations will lead to the same phenotypes due to the dominance of certain traits.

If we only look at the different phenotypes (physical appearances), we get:
Yellow seeds and red flowers
Yellow seeds and pink flowers
Yellow seeds and white flowers
Green seeds and red flowers
Green seeds and pink flowers
Green seeds and white flowers
These are the 6 different phenotypes expected in the F_2 generation.

Question15

Frequency of recombination between gene pairs on same chromosome as a measure of the distance between genes to map their position on chromosome, was used for the first time by
[NEET 2023]

Options:

A. Sutton and Boveri

B. Alfred Sturtevant

C. Henking

D. Thomas Hunt Morgan

Answer: B

Solution:

Solution:

Alfred Sturtevant used the frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes and 'mapped' their position on the chromosome.

Sutton and Boveri proposed chromosomal theory of inheritance.

Henking discovered X-chromosome.

Thomas Hunt Morgan proved chromosomal theory of inheritance and proposed the concept of linkage.

Question16

Which of the following statements are correct about Klinefelter's Syndrome?
A. This disorder was first described by Langdon Down (1866).
B. Such an individual has overall masculine development. However, the

feminine development is also expressed.
C. The affected individual is short statured.
D. Physical, psychomotor and mental development is retarded.
E. Such individuals are sterile.

Choose the correct answer from the options given below:
[NEET 2023]

Options:

A. C and D only

B. B and E only

C. A and E only

D. A and B only

Answer: B

Solution:

Solution:

Klinefelter's syndrome is caused due to the presence of an additional copy of X-chromosome resulting into a karyotype of 47,XXY. Such an individual has overall masculine development, however, the feminine development is also expressed. Such individuals are sterile. Thus, statement B and E are correct regarding Klinefelter's syndrome.

Statement A, C and D are incorrect w.r.t. Klinefelter's syndrome as they are associated with Down's syndrome.

Question17

Broad palm with single palm crease is visible in a person suffering from-
[NEET 2023]

Options:

A. Turner’s syndrome

B. Klinefelter’s syndrome

C. Thalassemia

D. Down’s syndrome

Answer: D

Solution:

Solution:

Down’s syndrome is caused by an additional copy of chromosome number 21. Its symptoms include–

a. Broad palm with characteristic palm crease

b. Short statured with small round head

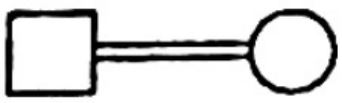
c. Furrowed tongue and partially open mouth, etc.

Question18

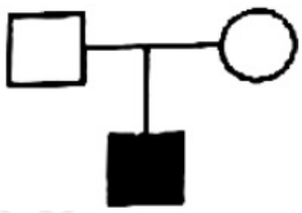
Which one of the following symbols represents mating between relatives in human pedigree analysis?
[NEET 2023]

Options:

A.

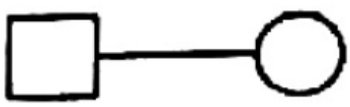


B.



C.

D.

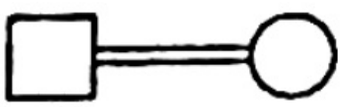


Answer: A

Solution:

Solution:

The symbol representing mating between relatives (consanguineous mating) in human pedigree analysis is



Question19

Given below are two statements:

Statement I:
Sickle cell anaemia and Haemophilia are autosomal dominant traits.

Statement II:
Sickle cell anaemia and Haemophilia are disorders of the blood.

In the light of the above statements, choose the correct answer from the options given below:
[NEET Re-2022]

Options:

A. Statement is incorrect but Statement II is correct

B. Both Statement I and Statement II are correct

C. Both Statement I and Statement II are incorrect

D. Statement I is correct but Statement II is incorrect

Answer: A

Solution:

Solution:

Sickle cell anaemia is an autosomal recessive trait whereas haemophilia is an X-linked recessive trait. Both the diseases are related to blood.

Question20

The chromosomal theory of inheritance was proposed by
[NEET Re-2022]

Options:

A. Robert Brown

B. Thomas Morgan

C. Sutton and Boveri

D. Gregor Mendel

Answer: C

Solution:

Solution:

The chromosomal theory of inheritance was proposed by Sutton and Boveri in 1902-1903.

Question21

What is the expected percentage of F2 progeny with yellow and inflated pod in dihybrid cross experiment involving pea plants with green

coloured, inflated pod and yellow coloured constricted pod?
[NEET Re-2022]

Options:

A. 9%

B. 100%

C. 56.25%

D. 18.75%

Answer: D

Solution:

Green, Inflated Pod	×	yellow, constricted Pod
	↓	
F_1-	All green	inflated
F_2-	9 : 3 : 3 : 1	−Phenotypic ratio

9− Green inflated

3 - Green, constricted

3− Yellow, inflated

1− Yellow, constricted

Since, yellow inflated (recombinants) are $\frac{3}{16} = 18.75\%$

Question22

If a female individual is with small round head, furrowed tongue, partially open mouth and broad palm with characteristic palm crease. Also the physical, psychomotor and mental development is retarded. The karyotype analysis of such an individual will show
[NEET Re-2022]

Options:

A. Trisomy of chromosome 21

B. 47 chromosomes with X X Y sex chromosomes

C. 45 chromosomes with XO sex chromosomes

D. 47 Chromosomes with XYY sex chromosomes

Answer: A

Solution:

Karyotype is a preparation of complete set of metaphase chromosomes in an individual organism/cell.

Trisomy of 21/Down's syndrome is presence of an additional 21st chromosome. This is a type of Aneuploidy. [2n+1]

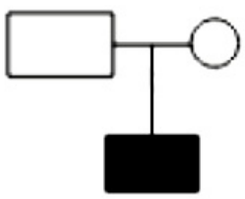
Aneuploidy is a result of failure of segregation of chromosomes (Non-disjunction) during gamete formation (meiosis I/II)

Question23

Select the incorrect match regarding the symbols used in Pedigree analysis
[NEET Re-2022]

Options:

A.



Parent with male child affected with disease

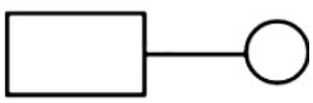
B.

Sex unspecified

C.

Affected individual

D.

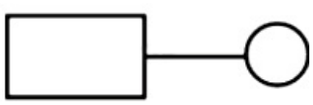


Consanguineous mating

Answer: D

Solution:

Solution:



Mating between Relative (consanguineous mating)

Question24

A normal girl, whose mother is haemophilic marries a male with no ancestral history of haemophilia. What will be the possible phenotypes of the offsprings?
(a) Haemophilic son and haemophilic daughter.
(b) Haemophilic son and carrier daughter.
(c) Normal daughter and normal son.
(d) Normal son and haemophilic daughter.

Choose the most appropriate answer from the options given below : [NEET Re-2022]

Options:

A. (b) and (d) only

B. (a) and (b) only

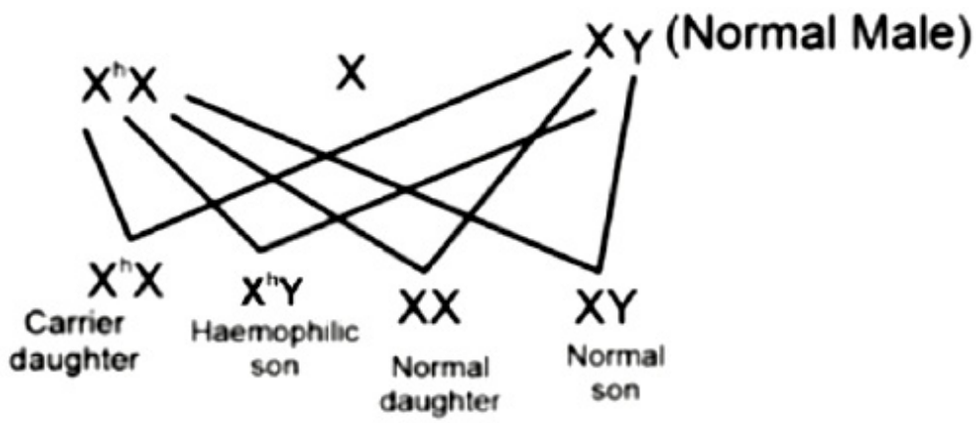
C. (b) and (c) only

D. (a) and (d) only

Answer: C

Solution:

Normal girls whose mother was Haemophilic. Haemophilia is a X linked Recessive disease X^hX is genotype of daughter as she receives one Xh from mother



Question25

XO type of sex determination can be found in : [NEET-2022]

Options:

A. Drosophila

B. Birds

C. Grasshoppers

D. Monkeys

Answer: C

Solution:

Solution:

Grasshopper is an example of XO type of sex determination in which the males have only oneX-chromosome besides the autosomes, whereas females have a pair of X-chromosomes.

Question26

Given below are two statements :

Statement I :
Mendel studied seven pairs of contrasting traits in pea plants and proposed the Laws of Inheritance.
Statement II :
Seven characters examined by Mendel in his experiment on pea plants were seed shape and colour, flower
colour, pod shape and colour, flower position and stem height.

In the light of the above statements, choose the correct answer from the options given below
[NEET-2022]

Options:

A. Both Statement I and Statement II are correct

B. Both Statement I and Statement II are incorrect

C. Statement I is correct but Statement II is incorrect

D. Statement I is incorrect but Statement II is correct

Answer: A

Solution:

Gregor J. Mendel, conducted hybridisation experiments on garden peas and selected 14 true breeding pea plant

varieties (seven contrasting traits). Contrasting traits studied were smooth or wrinkled seeds,yellow or green seeds, inflated on constricted pods, green or yellow pods, tall or dwarf plants, violet or white flowers and axial or terminal flower positions.

Question27

Which of the following occurs due to the presence of autosome linked dominant trait ?
[NEET-2022]

Options:

A. Sickle cell anaemia

B. Myotonic dystrophy

C. Haemophilia

D. Thalessemia

Answer: B

Solution:

Solution:

Haemophilia is a X-linked recessive disorder. Thalassemia is an autosomal recessive disorder. Sickle cell anaemia is an autosomal recessive disorder.

Myotonic dystrophy is an autosomal dominant disorder i.e. it occurs due to the presence of autosomal linked dominant trait.

Question28

Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : Mendel’s law of Independent assortment does not hold good for the genes that are located closely on the same chromosome.
Reason (R) : Closely located genes assort independently.

In the light of the above statements, choose the correct answer from the options given below
[NEET-2022]

Options:

A. Both (A) and (R) are correct and (R) is the 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 not correct

D. (A) is not correct but (R) is correct

Answer: C

Solution:

Closely located genes do not show independent assortment. Mendel's law of independent assortment holds good for those genes which are located on different chromosomes.

Question29

If '8' Drosophila in a laboratory population of '80' died during a week, the death rate in the population is_____ individuals per Drosophila per week.
[NEET-2022]

Options:

A. 0.1

B. 10

C. 1.0

D. zero

Answer: A

Solution:

Solution:

If 8 Drosophila in a laboratory population of 80 died during a week, the death rate in the population is 8/80 = 0.1individuals per Drosophila per week.

Question30

If a colour blind female marries a man whose mother was also colour blind, what are the chances of her progeny having colour blindness?
[NEET-2022]

Options:

A. 25%

B. 50%

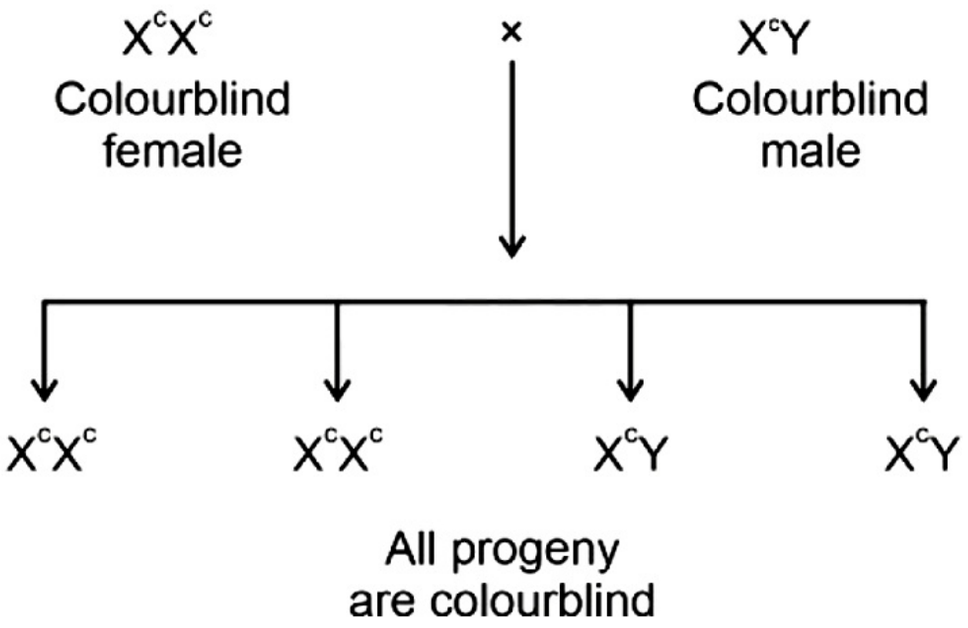
C. 75%

D. 100%

Answer: D

Solution:

If mother of man is colourblind, then man will also be colourblind as colour blindness is a X-linkedrecessive trait and shows criss-cross inheritance.



Question31

The recombination frequency between the genes a \& c is 5%, b&c is 15%, b&d is 9%, a&b is 20%, c& d is 24% and a &d is 29%. What will be the sequence of these genes on a linear chromosome? [NEET-2022]

Options:

A. a, d , b, c

B. d , b, a, c

C. a, b, c, d

D. a, c, b, d

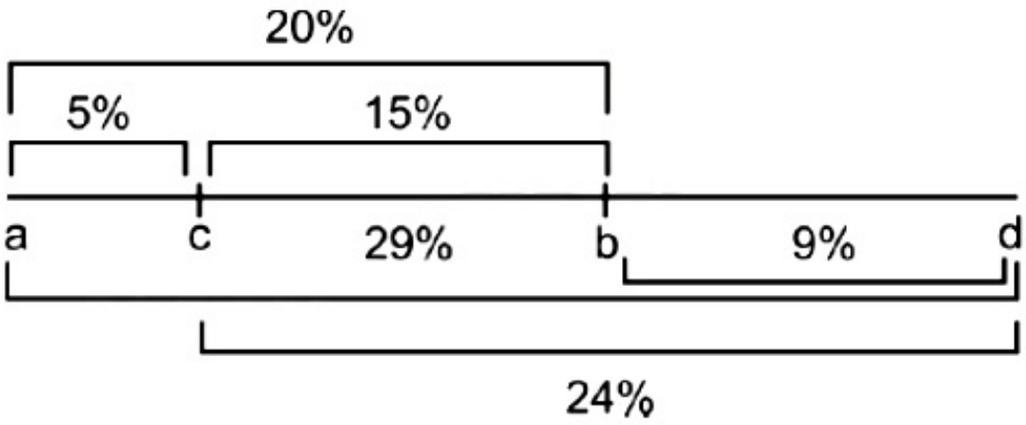
Answer: D

Solution:

Solution:

1% recombination frequency =1 centi Morgan

To place the genes on a linear chromosome, decreasing order of recombination frequency will be considered.



Question32

The production of gametes by the parents, formation of zygotes, the F_1 and F_2 plants, can be understood from a diagram called :
[NEET 2021]

Options:

A. Bullet square

B. Punch square

C. Punnett square

D. Net square

Answer: C

Solution:

Solution:

The production of gametes (n) by the parents (2n), the formation of the zygote (2n), the F_1 and F_2 plants can be understood from a diagram called Punnett square.

Question33

Now a days it is possible to detect the mutated gene causing cancer by allowing radioactive probe to hybridise its complimentary DNA in a clone of cells, followed by its detection using autoradiography because:
[NEET 2021]

Options:

A. Mutated gene partially appears on a photographic film

B. Mutated gene completely and clearly appears on a photographic film

C. Mutated gene does not appear on a photographic film as the probe has no complementarity with it

D. Mutated gene does not appear on photographic film as the probe has complementarity with it

Answer: C

Solution:

Autoradiography allows the detection/localisation of radioactive isotope within a biological sample.
Probe is a radiolabelled ss DNA or ss RNA depending on the technique. To identify the mutated gene probe is allowed to hybridise to its complementary DNA in a clone of cells followed by detection using autoradiography. The mutated gene will not appear on the photographic film, because the probe does not have complementarity with the mutated gene.

Question34

In a cross between a male and female, both heterozygous for sickle cell anaemia gene, what percentage of the progeny will be diseased? [NEET 2021]

Options:

A. 50%

B. 75%

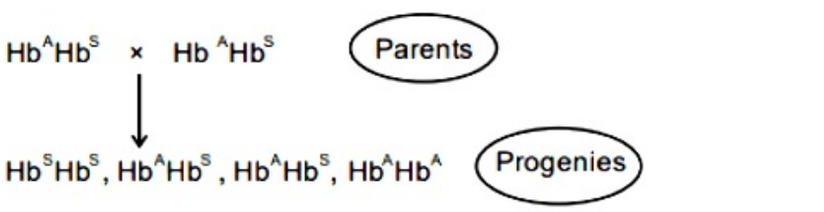
C. 25%

D. 100%

Answer: C

Solution:

According to given question;



Total number of affected progenies = 1

$\therefore$ Percentage of diseased/affected progenies $= \frac{1}{4} \times 100 = 25\%$

Question35

Experimental verification of the chromosomal theory of inheritance was done by
[NEET-2020]

Options:

A. Sutton

B. Boveri

C. Morgan

D. Mendel

Answer: C

Solution:

Solution:

Experimental verification of the chromosomal theory of inheritance was done by Morgan.

Note: Sutton and Boveri proposed chromosomal theory of inheritance but it was experimentally verified by T.H. Morgan.

Question36

Embryological support for evolution was disapproved by
[NEET-2020]

Options:

A. Alfred Wallace

B. Charles Darwin

C. Oparin

D. Karl Ernst von Baer

Answer: D

Solution:

Embryological support for evolution was disapproved by Karl Ernst von Baer, he noted that embryos never pass through the adult stages of other animals during embryonic development.

Question37

Select the correct match
[NEET-2020]

Options:

A. Phenylketonuria – Autosomal dominant trait

B. Sickle cell anaemia – Autosomal recessive trait, chromosome-11

C. Thalassemia – X linked

D. Haemophilia – Y linked

Answer: B

Solution:

Phenylketonuria – Autosomal recessive disorder

Thalassemia – Autosomal recessive disorder

Haemophilia – X linked recessive disorder

Sickle cell anaemia – Autosomal recessive trait, caused due to mutation in gene present on chromosome no. 11

Question38

Match the items of column I with column II

Column I	Column II
(a) XX-XO method of sex determination syndrome	(i) Turner's syndrome
(b) XX-XY method of sex determination	(ii) Female heterogametic
(c) Karyotype-45	(iii) Grasshopper
(d) ZW-ZZ method of sex determination	(iv) Female homogametic

Select the correct option from the following : [NEET OD 2019]

Options:

A. a-ii, b-iv, c-i, d-iii

B. a-i, b-iv, c-ii, d-iii

C. a-iii, b-iv, c-i, d-ii

D. a-iv, b-ii, c-i, d-iii

Answer: C

Question39

The production of gametes by the parents, the formation of zygotes, the F_1 and F_2 plants, can be understood using
[NEET OD 2019]

Options:

A. Pie diagram

B. A pyramid diagram

C. Punnet square

D. Wenn diagram

Answer: C

Question40

In a marriage between male with blood group A and female with blood group B, the progeny had either blood group AB or B. What could be the possible genotype of parents?
[NEET OD 2019]

Options:

A. I^{A_i} (Male) : I^BI^B (Female)

B. I^AI^A (Male) : I^{BB} (Female)

C. I^AA^A (Male) : I B_i (Female)

D. I^{A_i} (Male) : I^{B_i} (Female)

Answer: A

Question41

In Antirrhinum (Snapdragon), a red flower was crossed with a white flower and in F_1 generation pink flowers were obtained. When pink flowers were selfed, the F_2 generation showed white, red and pink flowers. Choose the incorrect statement from the following :
[NEET 2019]

Options:

A. Pink colour in F_1 is due to incomplete dominance.

B. Ratio of F_2 is $\frac{1}{4}$ (Red) : $\frac{2}{4}$ (Pink) : $\frac{1}{4}$ (White)

C. Law of Segregation does not apply in this experiment

D. This experiment does not follow the Principle of Dominance.

Answer: C

Solution:

Solution:

Genes for flower colour in snapdragon shows incomplete dominance which is an exception of Mendel's first principle i.e. Law of dominance.

Whereas Law of segregation is universally applicable.

Question42

What map unit (Centimorgan) is adopted in the construction of genetic maps?
[NEET 2019]

Options:

A. A unit of distance between two expressed genes representing 100% cross over.

B. A unit of distance between genes on chromosomes, representing 1% cross over.

C. A unit of distance between genes on chromosomes, representing 50% cross over.

D. A unit of distance between two expressed genes representing 10% cross over.

Answer: B

Solution:

1 map unit represent 1 % cross over.

Map unit is used to measure genetic distance.

This genetic distance is based on average number of cross over frequency.

Question43

Select the incorrect statement.
[NEET 2019]

Options:

A. In male grasshoppers 50% of sperms have no sex-chromosome

B. In domesticated fowls, sex of progeny depends on the type of sperm rather than egg

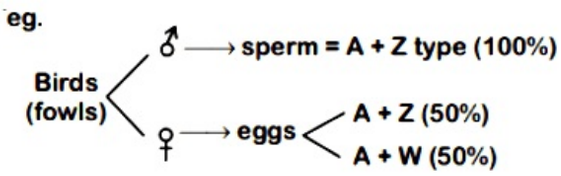
C. Human males have one of their sex- chromosome much shorter than the other

D. Male fruit fly is heterogametic

Answer: B

Solution:

In birds female heterogamety is found thus sex of progeny depends on the types of egg rather than the type of sperm.



Question44

In which genetic condition, each cell in the affected person, has three sex chromosomes XXY?
[NEET OD 2019]

Options:

A. Thalassemia

B. Kleinfelter's Syndrome

C. Phenylketonuria

D. Turner's Syndrome

Answer: B

Question45

A woman has an X-linked condition on one of her X chromosomes. This chromosome can be inherited by
[NEET 2018]

Options:

A. Only daughters

B. Only sons

C. Both sons and daughters

D. Only grandchildren

Answer: C

Solution:

Woman is a carrier

Both son & daughter inherit X–chromosome

Although only son be the diseased

Question46

Which of the following characteristics represent ‘Inheritance of blood groups’ inhumans?
a) Dominance
b) Co-dominance
c) Multiple allele
d) Incomplete dominance
e) Polygenic inheritance
[NEET 2018]

Options:

A. b, c and e

B. a, b and c

C. a, c and e

D. b, d and e

Answer: B

Solution:

Solution:

Inheritance in the human blood group shows multiple alleles, dominance as well as codominance.

a. The Rh(D) group is also dominant and will be expressed if inherited from either parent.

b. Within the ABO Blood Group system, the A and B genes are co-dominant, i.e. these will be expressed whenever the gene is present. The O gene is silent and only expressed when neither A nor B is present.

c. Three alleles are responsible for the different types of blood groups in humans which shows multiple allelism.

Question47

Thalassemia and sickle cell anemia are caused due to a problem in globin molecule synthesis. Select the correct statement :
[NEET 2017]

Options:

A. Both are due to a quantitative defect in globin chain synthesis

B. Thalassemia is due to less synthesis of globin molecules

C. Sickel cell anemia is due to a quantitative problem of globin molecules

D. Both are due to a qualitative defect in globin chain synthesis

Answer: B

Question48

The genotypes of a husband and Wife are I^AI^B and I^Ai,Among the blood types of their children, how many different genotypes and phenotypes are possible?
[NEET 2017]

Options:

A. 3 genotypes ; 4 phenotypes

B. 4 genotypes ; 3 phenotypes

C. 4 genotypes ; 4 phenotypes

D. 3 genotypes ; 3 phenotypes

Answer: B

Solution:

The genotype of a husband and wife are I^AI^B and I^AI

Four different possible genotypes of their children are:

$I^AI^B, I^AI, I^BI, I^AI^A$

The possible number of phenotypes of their children are:

Blood group A (I^AI^A, I^AI)

Blood group B (I^BI)

Blood group AB (I^AI^B)

Question49

A disease caused by an autosomal primary non-disjunction is :
[NEET 2017]

Options:

A. Klinefelter's Syndrome

B. Turner's Syndrome

C. Sickel Cell Anemia

D. Down's Syndrome

Answer: D

Question50

Among the following characters, which one was not considered by Mendel in his experiments on peas ? [NEET 2017]

Options:

A. Trichomes-Glandular or non-glandular

B. Seed-Green or Yellow

C. Pod-Inflated or Constricted

D. Stem -Tall or Dwarf

Answer: A

Solution:

Mendel considered the following characters of pea in his experiments:

	Character	Dominant	Recessive
1.	Seed shape	Round (R)	Wrinkled (r)
2.	Seed cotyledon colour	Yellow (Y)	Green (y)
3.	Flower colour	Violet (V)	White (v)
4.	Pod shape	Inflated (I)	Constricted (i)
5.	Pod colour	Green (G)	Yellow (g)
6.	Flower position	Axial (A)	Terminal (a)
7.	Stem height	Tall (T)	Dwarf (t)

Question51

Which one from those given below is the period for Mendel's hybridization experiments ?
[NEET 2017]

Options:

A. 1840 - 1850

B. 1857 - 1869

C. 1870 - 1877

D. 1856 - 1863

Answer: D

Question52

The mechanism that causes a gene to move from one linkage group to another is called
[NEET 2016 P2]

Options:

A. Corossing-over

B. inversion

C. duplication

D. translocation

Answer: D

Question53

If a colour-blind man marries a woman who is homozygous for normal colour vision, the probability of their son being colour-blind is
[NEET 2016 P2]

Options:

A. 1

B. 0

C. 0·5

D. 0.75

Answer: B

Question54

A cell at telophase stage is observed by a student in a plant brought from the field. He tells his teacher that this cell is not like other cells at telophase stage. There is no formation of cell plate and thus the cell is containing more number of chromosomes as compared to other dividing cells. This would resultin [NEET 2016 P1]

Options:

A. Polyteny

B. Aneuploidy

C. Polyploidy

D. Somaclonal variation

Answer: C

Solution:

Solution:

When Nuclear membrane and cell plate is not formed in a cell during telophase of mitosis then polyploid cell is formed.

Question55

Pick out the correct statements :
(a) Haemophilia is a sex-linked recessive disease.
(b) Down's syndrome is due to aneuploidy.
(c) Phenylketonuria is an autosomal recessive gene disorder.
(d) Sickle cell anaemia is an X-linked recessive gene disorder.
[NEET 2016 P1]

Options:

A. (a), (b) and (c)are correct.

B. (a) and (d) are correct.

C. (b) and (d) are correct.

D. (a), (c) and (d) are correct.

Answer: A

Solution:

Solution:

Sickle cell anemia is an autosomal codominant disorder

Question56

A tall true breeding garden pea plant is crossed with a dwarf true breeding garden pea plant. When the F_1 plants were selfed the resulting genotypes were in the ratio of :
[NEET 2016 P1]

Options:

A. 3 : 1 : : Dwarf : Tall

B. 1 : 2 : 1 : : Tall homozygous : Tall heterozygous : Dwarf

C. 1 : 2 : 1 : : Tall heterozygous : Tall homozygous : Dwarf

D. 3 : 1 : : Tall : Dwarf

Answer: B

Question57

Match the terms in Column I with their description in Column II and choose the correct option:

Column I	Column II
(a) Dominance	(i) Many genes govern a single character
(b) Codominance	(ii) In a heterozygous organism only one allele expresses itself
(c) Pleiotropy	(iii) In a heterozygous organism both alleles express themselves fully
(d) Polygenic inheritance	(iv) A single gene influences many characters

[NEET 2016 P1]

Options:

A. $\overset{a}{(iv)}\ \overset{b}{(iii)}\ \overset{c}{(i)}\ \overset{d}{(ii)}$

B. (ii) (i) (iv) (iii)

C. (ii) (iii) (iv) (i)

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

Answer: C

Solution:

Solution:

Question58

In a testcross involving F_1 dihybrid flies, more parental-type offspring were produced than the recombinant-type offspring. This indicates : [NEET 2016 P1]

Options:

A. Both of the characters are controlled by more than one gene.

B. The two genes are located on two different chromosomes.

C. Chromosomes failed to separate during meiosis.

D. The two genes are linked and present on the same chromosome

Answer: D

Solution:

If a plant with genotype Aa Bb is crossed with aabb then Independent Assortment would result in production of 4 type of offsprings in equal proportion.

Aa Bb - Gametes	AB	Ab	ab
aa bb - Gametes	ab	ab	ab

offspring according to independent assortment

Aa Bb	Aabb	aaBb	aabb
1 :	1 :	1 :	1 :
(parental)	(Recombinants)		(Parental)

Since parental percentage is more then recombinants it is due to linkage between genes A and B.

Question59

Which of the following most appropriately describes haemophilia ? [NEET 2016 P1]

Options:

A. Dominant gene disorder

B. Recessive gene disorder

C. X-linked recessive gene disorder

D. Chromosomal disorder

Answer: C

Solution:

Solution:

Gene related with haemophilia is always present on X chromosome and it is present on X chromosome and it is recessive gene disorder as it express itself in females when comes an homonzygous condition

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Question60

A gene showing codominance has (2015)

Options:

A. alleles that are recessive to each other

B. both alleles independently expressed in the heterozygote

C. one allele dominant on the other

D. alleles tightly linked on the same chromosome.

Answer: B

Solution:

Solution:
The phenomenon of expression of both the alleles in a heterozygote is called codominance. The alleles which do not show dominance-recessiverelationship and are able to express themselves independently when present together are called codominant alleles. As a result the heterozygous condition has a phenotype different from either of homozygous genotypes, e, g. alleles for blood group A (I^A) and for blood group B(I^B) are codominant so that when they come together in an individual, they produce blood group AB.

Question61

In his classic experiments on pea plants, Mendel did not use (2015)

Options:

A. seed shape

B. flower position

C. seed colour

D. pod length.

Answer: D

Solution:

Mendel selected 14 true breeding pea plant varieties, as pairs which were similar except for one character with contrasting traits.

S.No	Character	Contrasting traits	Chromosome number
1.	Stem height	Tall / dwarf	4
2.	Flower position	Axial/terminal	4
3.	Flower colour	Violet/white	1
4.	Pod shape	Inflated/constricted	4
5.	Pod colour	Green/yellow	5
6.	Seed colour	Yellow/Green	1
7.	Seed shape	Round/wrinkled	7

In this 1 character is related to stem height, 2 characters are related to flower, 2 characters related to pod, 2 characters are related to seed.
So, the correct option is 'Pod length'.

Question62

A colour blind man marries a woman with normal sight who has no history of colour blindness in her family. What is the probability of their grandson being colour blind ?
(2015)

Options:

A. Nil

B. 0.25

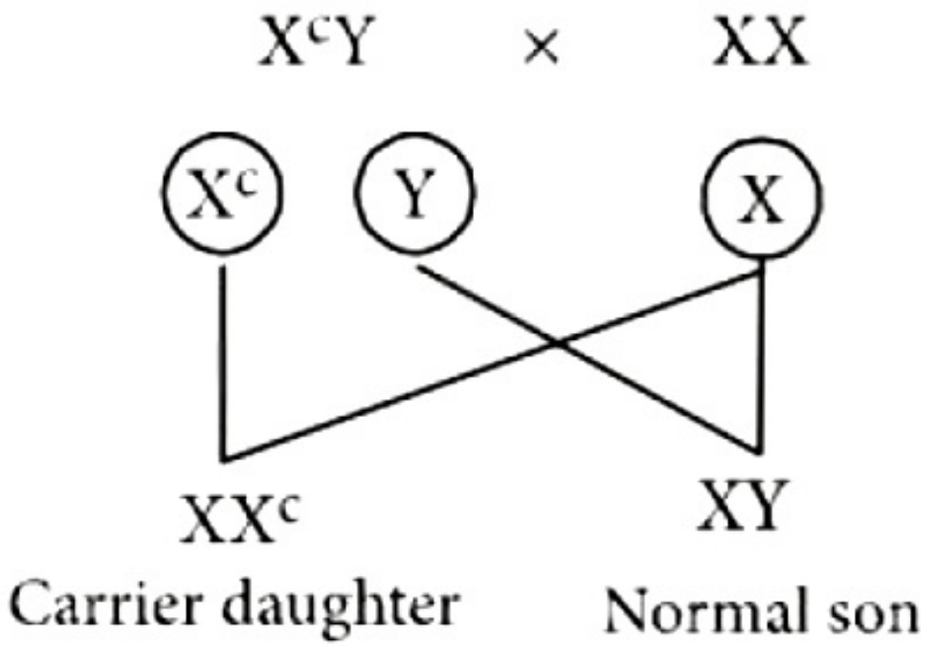
C. 0.5

D. 1

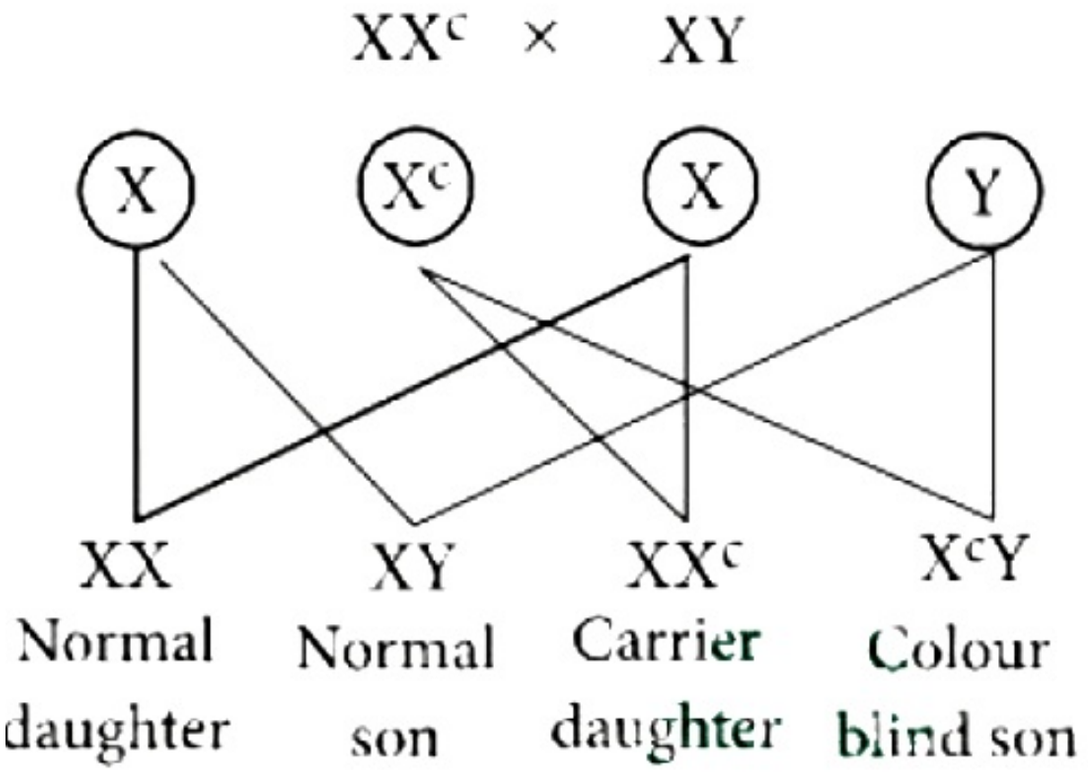
Answer: B

Solution:

Solution:
When a colour blind man ($X^{\circ}Y$) marries a normal woman (XX), all of their daughters are carriers and all of their sons are normal, as shown in following figure:



When the carrier daughter ($X X^c$) is married to a normal man, the probability of their son being colour blind is 0.25 , as shown in following figure:



From above crosses, it is clear that the probability of occurrence of colour blindness in the grandson of a colour blind man and a normal woman is 0.25 .

Question63

A pleiotropic gene
(2015)

Options:

A. controls a trait only in 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.

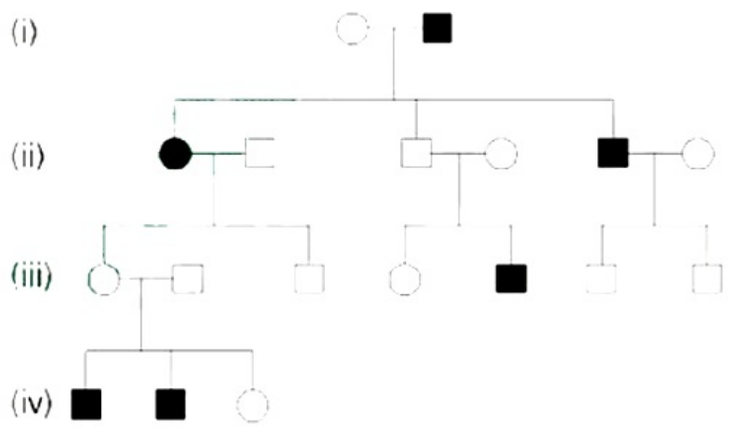
Answer: B

Solution:

Solution:
The ability of a gene to have multiple phenotypic effects because it influences a number of characters simultaneously is known as pleiotropy. The gene having a multiple phenotypic effect because of its ability to control expression of two or more characters is called pleiotropic gene. In human beings pleiotropy is exhibited by syndromes called sickle cell anaemia and phenylketonuria.

Question64

In the following human pedigree, the filled symbols represent the affected individuals. Identify the type of given pedigree.



(2015)

Options:

A. Autosomal recessive

B. X-linked dominant

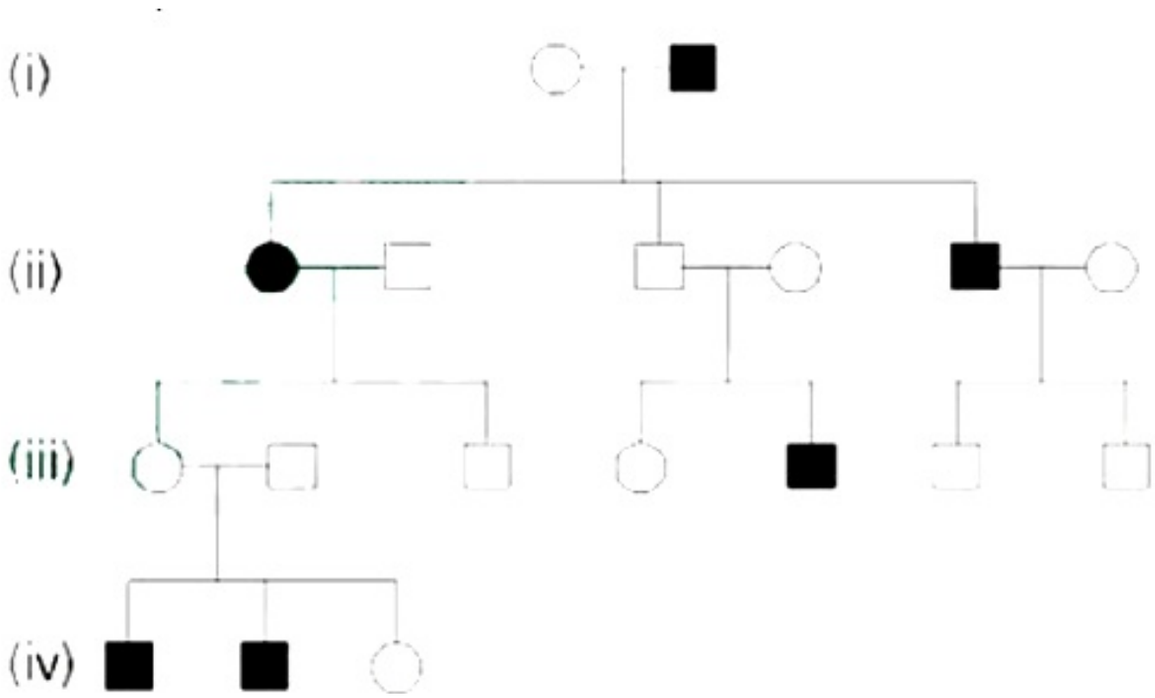
C. Autosomal dominant

D. X-linked recessive

Answer: A

Solution:

Autosomal recessive traits are the traits which are caused by recessive autosomal genes when present in homozygous condition. The given pedigree can be explained as:



As the trait appears only in homozygous recessive individuals (aa), therefore it is an autosomal recessive trait.

Question65

The term "linkage" was coined by (2015)

Options:

A. G. Mendel

B. W. Sutton

C. T.H. Morgan

D. T. Boveri.

Answer: C

Solution:

Linkage is the phenomenon of certain genes staying together during inheritance through generations without any change or separation due to their being present on the same chromosome. Linkage was first suggested by Sutton and Boveri (1902 – 1903) when they propounded the famous "chromosomal theory of inheritance." Bateson and Punnett (1906) while working on sweet pea found that the factors for certain characters do not show independent assortment. However, it was Morgan (1910) who clearly proved and defined linkage on the basis of his breeding experiments in fruit fly (Drosophila melanogaster).

Question66

The movement of a gene from one linkage group to another is called :- [NEET 2015 C]

Options:

A. Duplication

B. Translocation

C. Crossing over

D. Inversion

Answer: B

Question67

Alleles are :
[NEET 2015 C]

Options:

A. true breeding homozygotes

B. different molecular forms of a gene

C. heterozygotes

D. different phenotype

Answer: B

Question68

Multiple alleles are present :
[NEET 2015 C]

Options:

A. At different loci on the same chromosome

B. At the same locus of the chromosome

C. On non-sister chromatids

D. On different chromosomes

Answer: B

Question69

A man with blood group 'A' marries a woman with blood group 'B'. What are all the possible blood groups of their offsprings ?
[NEET 2015 C]

Options:

A. A,B and AB only

B. A,B,AB and O

C. O only

D. A and B only

Answer: B

Question70

How many pairs of contrasting characters in pea plants were studied by Mendel in his experiments ?
[NEET 2015 C]

Options:

A. Six

B. Eight

C. Seven

D. Five

Answer: C

Question71

An abnormal human baby with 'XXX' sex chromosomes was born due to : [NEET 2015 C]

Options:

A. formation of abnormal ova in the mother

B. fusion of two ova and one sperm

C. fusion of two sperms and one ovum

D. formation of abnormal sperms in the father

Answer: A

Question72

Fruit colour in squash is an example of: [NEET 2014]

Options:

A. Recessive epistasis

B. Dominant epistasis

C. Complementary genes

D. Inhibitory genes

Answer: B

Solution:

Dominant epistasis is the phenomenon of masking or supressing the expression of a gene by a dominant non-allelic gene.

Question73

A man whose father was colour blind marries a woman who had a colour blind mother and normal father. What percentage of male children of this couple will be colour blind ?
[NEET 2014]

Options:

A. 25%

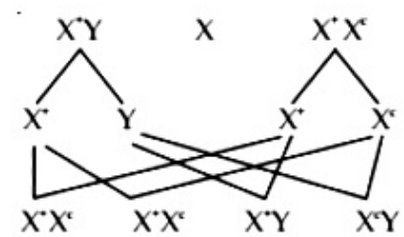
B. 0%

C. 50%

D. 75%

Answer: C

Solution:



Colourblind male = 50%

Question74

A human female with Turner's syndrome:
[NEET 2014]

Options:

A. has 45 chromosomes with XO

B. has one additional X chromosome.

C. exhibits male characters

D. is able to produce children with normal husband.

Answer: A

Solution:

Solution:
Turner's syndrome is caused due to the absence of one of the X chromosomes i.e. 45 with XO (or 44 + XO)

Question75

Select the incorrect statement with regard to haemophilia. (NEET 2013)

Options:

A. It is a dominant disease.

B. A single protein involved in the clotting of blood is affected.

C. It is a sex-linked disease.

D. It is a recessive disease.

Answer: A

Solution:

Solution:
Haemophilia is sex-linked disease which is also known as bleeder's disease as the patient will continue to bleed even from a minor cut since he or she does not possess the natural phenomenon of blood clotting due to absence of antihaemophiliac globulin or factor VIII (haemophilia-A) and plasma thromboplastin factor IX (haemophilia-B, Christmas disease) essential for it. As a result of continuous bleeding the patient may die of blood loss. It is genetically due to the presence of recessive sex linked gene h, carried by X -chromosome. A female becomes haemophiliac only when both of her X-chromosomes carry the gene ($\mathrm{X}^{\mathrm{h}}\mathrm{X}^{\mathrm{h}}$). However, such females generally die before birth because the combination of these two recessive alleles is lethal. A female having only one allele for haemophilia ($\mathrm{X}\mathrm{X}^{\mathrm{h}}$) appears normal because the allele for normal blood clotting present on the other X -chromosome is dominant. Such females are known as carriers. In case of males, a single gene for the defect is able to express itself as the Ychromosome is devoid of any corresponding allele ($\mathrm{X}^{\mathrm{h}}\mathrm{Y}$)

Question76

Which of the following cannot be detected in a developing foetus by amniocentesis?

(NEET 2013)

Options:

A. Down's syndrome

B. Jaundice

C. Klinefelter's syndrome

D. Sex of the foetus

Answer: B

Solution:

Solution:
(b): Amniocentesis is a foetal sex determination test in which amniotic fluid containing foetal cells which surrounds the developing embryo is extracted and cells are tested for chromosomal pattern to identify genetic disorders, if any. Jaundice is not a chromosomal disorder thus cannot be tested by amniocentesis.

Question77

If both parents are carriers for thalassaemia, which is an autosomal recessive disorder, what are the chances of pregnancy resulting in an affected child?
(NEET 2013)

Options:

A. 25%

B. 100%

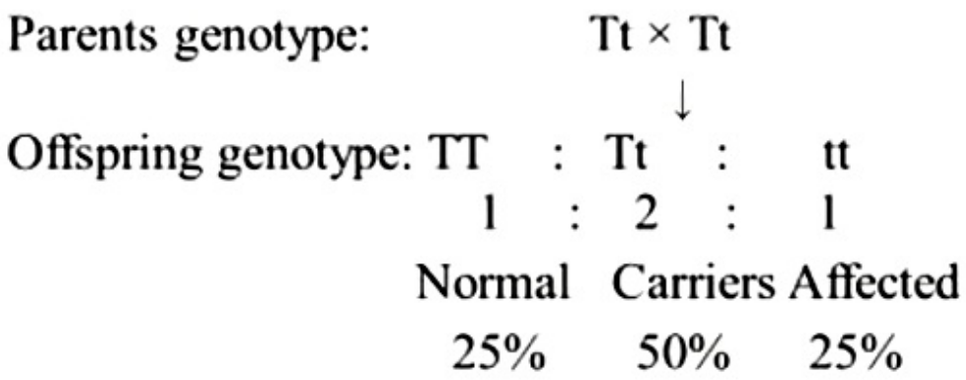
C. No chance

D. 50%

Answer: A

Solution:

Solution:
(a): Thalassaemia is an autosomal recessive blood disorder. In the given case, both the partners are una ffected carriers for the gene i.e., have heterozygous genotype Tt.
Persons homozygous for the autosomal recessive gene of β -thalassaemia suffer from severe haemolytic anaemia. Heterozygous persons are also not normal, but show the defect in a less severe form (thalassaemia minor).



Question78

If two persons with 'AB' blood group marry and have sufficiently large number of children, these children could be classified as 'A' blood group:
'AB' blood group : 'B" blood group in 1: 2: 1 ratio. Modern technique of protein electrophoresis reveals presence of both 'A' and 'B' type proteins in "AB blood group individuals. This in an example of
(NEET 2013)

Options:

A. partial dominance

B. complete dominance

C. codominance

D. incomplete dominance.

Answer: C

Solution:

In codominance, neither phenotype is completely dominant. Instead, the heterozygous individual expresses both phenotypes. A common example is the ABO blood group system. The gene for blood types has three alleles: A, B, and i. i causes O type and is recessive to both A and B. The A and B alleles are codominant with each other. When a person has both A and B, they have type AB blood. In codominance, it doesn't matter whether the alleles in the homologous chromosomes are dominant or recessive. If the homologous chromosome consists of two alleles that can produce proteins, then both will be produced and forms a different phenotype or characteristics to that of a homozygote.

Question79

Which idea is depicted by a cross in which the F_1 generation resembles both the parents?
(NEET 2013)

Options:

A. Inheritance of one gene

B. Codominance

C. Incomplete dominance

D. Complete dominance

Answer: B

Solution:

Solution:
In codominance, both the alleles are able to express themselves independently when present together resulting in a phenotype that is intermediate between both the parental homozygous phenotypes, thereby resembling both of them. E . g., roan coat colour in cattle is a result of co-dominance of alleles for white and red coat colour.

Question80

Which one is the incorrect statement with regard to the importance of pedigree analysis?
(KN NEET 2013)

Options:

A. It confirms that DNA is the carrier of genetic information.

B. It helps to understand whether the trait in question is dominant or recessive.

C. It confirms that the trait is linked to one of the autosome.

D. It helps to trace the inheritance of a specific trait

Answer: A

Solution:

Solution:
Pedigree analysis is a system of analysis by following the movement and distribution of certain genetic traits in many generations of a family. Pedigree analysis cannot confirm that DNA is the carrier of genetic information because it is an analysis system. For DNA based experiments, molecular biology techniques are used.

Question81

Down's syndrome in humans is due to (KN NEET 2013)

Options:

A. three 'X' chromosomes

B. three copies of chromosome 21

C. monosomy

D. two 'Y' chromosomes.

Answer: B

Solution:

Solution:
Down's syndrome is the trisomy of 21^{st} chromosome in man. Down's syndrome is characterized by short stature, warty skin, protruding tongue, slanting eyes, with folded eyelids. The affected person's face presents a typical mongoloid look. Hence it is also called as mongoloid idiocy. It occurs due to the phenomenon of non-disjunction. Non-disjunction occurs when a pair of homologous chromosomes do not separate in meiosis but migrate to the same pole of the cell resulting in an uneven number of chromosomes in the daughter cells (45 in one and 47 in other) This numerical abnormality results in trisomy $(2n + 1)$ and monosomy $(2n - 1)$. Non-disjunction is more common in sex chromosomes.

Question82

A normal-visioned man whose father was colourblind, marries a woman whose father was also colour-blind. They have their first child as a daughter. What are the chances that this child would be colour-blind? (2012)

Options:

A. 100%

B. Zero percent

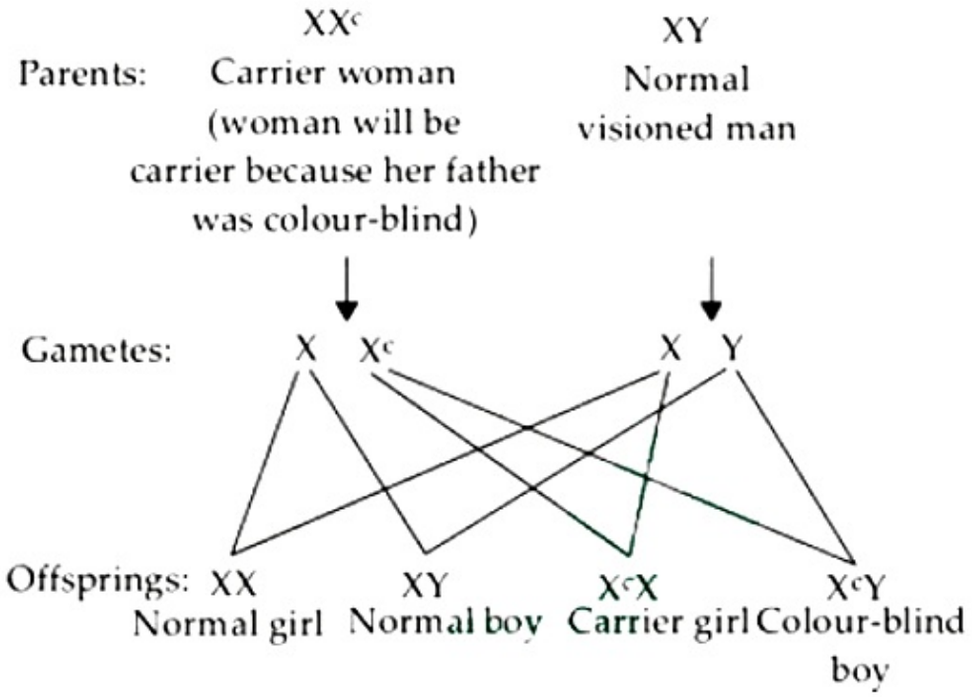
C. 25%

D. 50%

Answer: B

Solution:

Solution:
In the given condition the chances of child to be colour-blind is zero percent. It can be understood by the given cross:



Question83

F_2 generation in a Mendelian cross showed that both genotypic and phenotypic ratios are same as 1 : 2 : 1. It represents a case of (2012)

Options:

A. co-dominance

B. dihybrid cross

C. monohybrid cross with complete dominance

D. monohybrid cross with incomplete dominance.

Answer: D

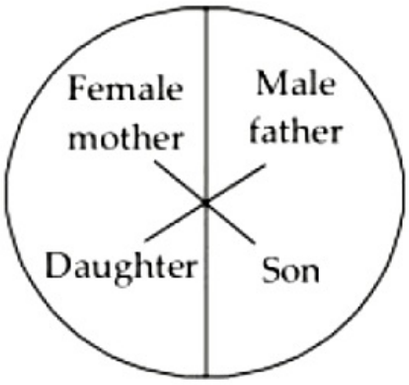
Solution:

Solution:
The inheritance of flower colour in the dog flower (snapdragon or Antirrhinum sp.) is a good example which shows incomplete dominance. In a cross between true-breeding red-flowered (RR) and true-breeding white-flowered plants (rr), the F_1 (Rr) was pink. When the F_1 was self-pollinated the F_2 resulted in the following ratio, 1(RR) Red : 2(Rr) Pink: 1 (rr)

White. Here the genotype ratios were 1: 2 I as in any Mendelian monohybrid cross, but the phenotype ratios had changed from the 3: 1 dominant recessive ratio to 1: 2: 1 .

Question84

Represented below is the inheritance pattern of a certain type of trait in humans. Which one of the following conditions could be an example of this pattern?



(Mains 2012)

Options:

A. Phenylketonuria

B. Sickle cell anaemia

C. Haemophilia

D. Thalassemia

Answer: C

Solution:

Solution:
The pattern suggests that the feature is inherited from mother to son and from dad to daughter. As we know, there are XY sex chromosomes for human males and XX sex chromosomes for human females. The mother's X chromosome is always inherited by a son and the father's Y chromosome, while the father always transfers his X chromosome to his daughters. An X-linked trait is often transmitted from mother to son and from father to daughter; hence, the trend demonstrates X-linked trait inheritance. If it were an autosomal trait, regardless of the child's sex, both parents would have passed it on with equal likelihood to all the offspring.
Phenylketonuria- It is an inborn metabolic error and is caused by a mutation found on chromosome 12 in the PAH gene. In an autosomal recessive form, it is inherited and therefore does not follow the pattern shown.
Sickle cell anaemia- is caused by a point mutation in the haemoglobin beta-globin (Hbb) chain gene found on chromosome 11. It is also inherited in a recessive autosomal manner and therefore does not follow the pattern shown.
Thalassemia- is a group of blood disorders caused by mutations found on chromosome 11 and chromosome 16 in the HbB and HbA genes, respectively. They are thus inherited in a recessive autosomal way.
Haemophilia is a sex-linked condition since there is an X-chromosome that is a human sex chromosome found in the controlling genes. The phenotype is transmitted in a sex-linked manner to offspring.

Question85

A test cross is carried out to
(Mains 2012)

Options:

A. determine the genotype of a plant at F

B. predict whether two traits are linked

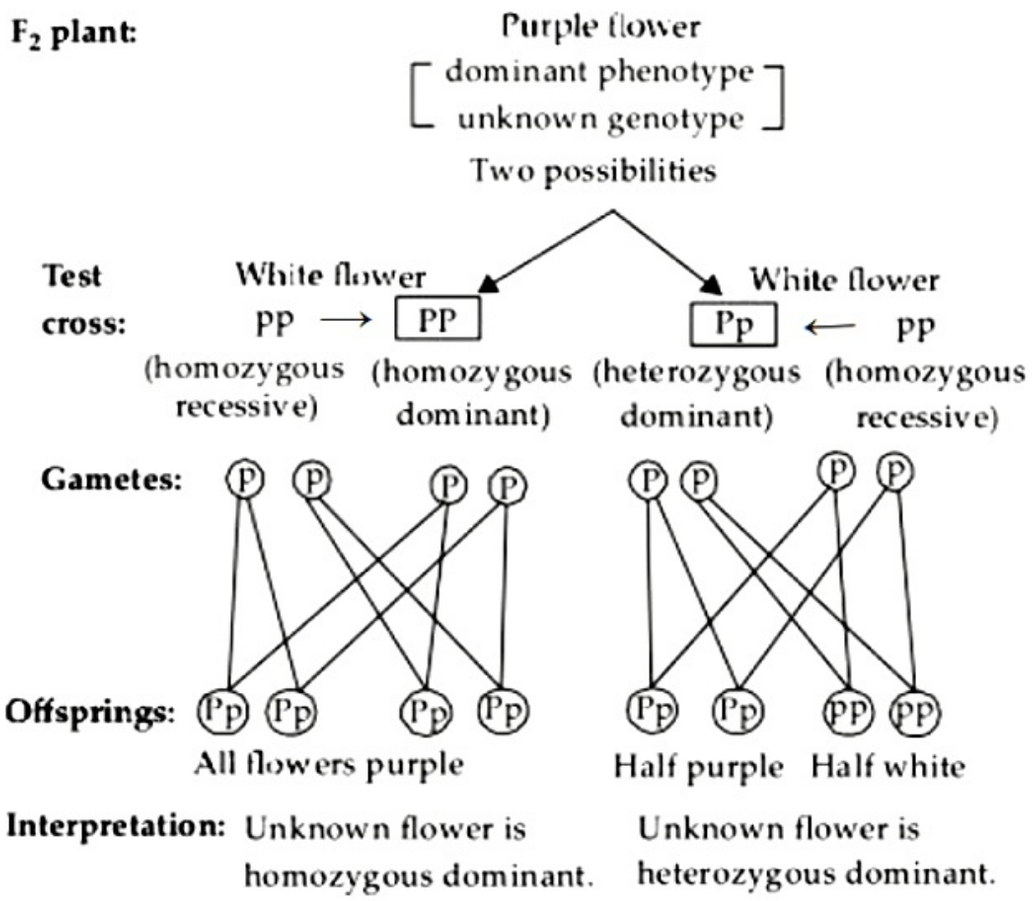
C. assess the number of alleles of a gene

D. determine whether two species or varieties will breed successfully.

Answer: A

Solution:

Solution:
Test cross is performed to determine the genotype of F_2 plant. In a typical test cross an organism showing dominant phenotype and whose genotype is to be determined is crossed with one that is homozygous recessive for the allele being investigated, instead of self-crossing. The progenies of such a cross can easily be analysed to predict the genotype of the test organism. Given ahead is an illustration of test cross:



Question86

When two unrelated individuals or lines are crossed, the performance of F , hybrid is often superior to both its parents. This phenomenon is called
(2011)

Options:

A. heterosis

B. transformation

C. splicing

D. metamorphosis.

Answer: A

Solution:

Solution:
The increased vigour displayed by the offspring from a cross between genetically different parents is called heterosis. Hybrids from crosses between different crop varieties ($\mathrm{mathrm\,F}_1$ hybrids) are often stronger and produce better yields than the original varieties.

Question87

Which one of the following conditions correctly describes the manner of determining the sex?
(2011)

Options:

A. Homozygous sex chromosomes (Z Z) determine female sex in birds.

B. XO type of sex chromosomes determine male sex in grasshopper.

C. XO condition in humans as found in Turner's syndrome, determines female sex.

D. Homozygous sex chromosomes (X X) produce male in Drosophila

Answer: B

Solution:

Solution:
XO type of sex chromosomes determine male sex in grasshoppers. This type of sex determination comes under XX-XO type. Its common examples are cockroaches, grasshoppers and bugs. The female has two homomorphic sex chromosomes XX and is homogametic. It produces similar eggs, each with X-chromosome. The male has one chromosome only and is heterogametic. It produces 2 types of sperms : gynosperms with X and androsperms withoutX. Fertilisation of an egg by X-bearing sperm yields female offspring and by no X sperm yields male offspring.

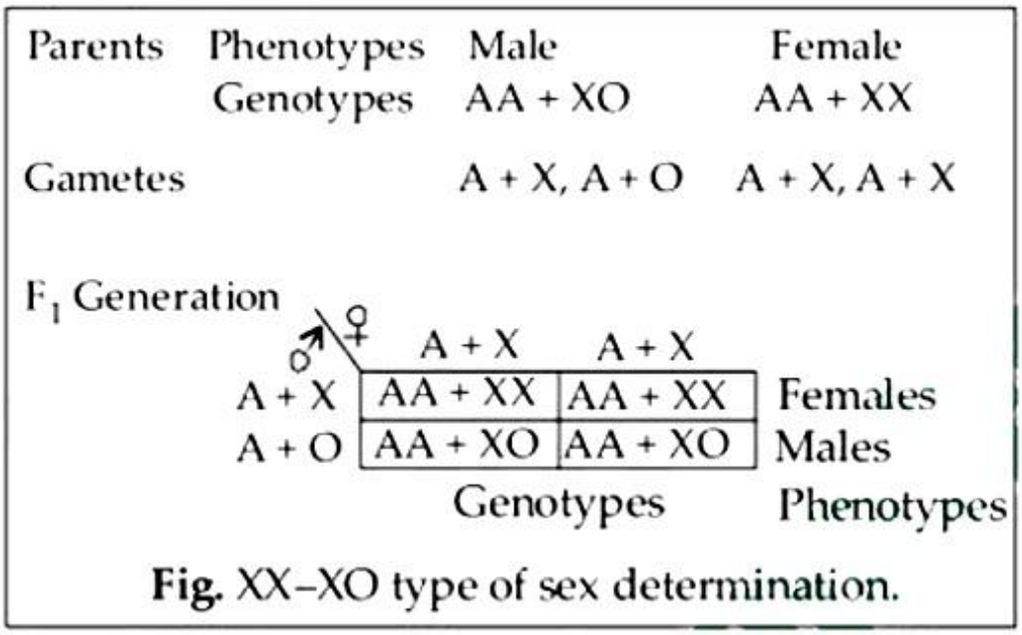


Fig. XX–XO type of sex determination.

Question88

Which one of the following conditions of the zygotic cell would lead to the birth of a normal human female child? (Mains 2011)

Options:

A. Two X chromosomes

B. Only one Y chromosome

C. Only one X chromosome

D. One X and one Y chromosome

Answer: A

Solution:

Solution:
In humans, the female has a pair of X chromosome (homogametic composition) and the male has XY chromosomes (heterogametic composition). Therefore, two normal X chromosomes in zygotic cell lead to the birth of a normal human female child.

Question89

Test cross in plants or in Drosophila involves crossing (Mains 2011)

Options:

A. between two genotypes with recessive trait

B. between two F hybrids

C. the F_1, hybrid with a double recessive genotype

D. between two genotypes with dominant trait.

Answer: C

Question90

Which one of the following symbols and its representation, used in human pedigree analysis is correct? (2010)

Options:

A. =◯ = Mating between relatives

B. ◯ = Unaffected male

C. = Unaffected female

D. ◆ = Male affected

Answer: A

Solution:

Solution:
(a): A record of inheritance of certain genetic traits for two or more generations presented in the form of a diagram or family tree is called pedigree. In a pedigree a square represents the male, a circle the female, solid (blackened) symbol shows the trait under study or affected individual; unaffected or normal individual by an open or clear symbol and a cross or shade (of any type) in the symbol signifies the carrier of a recessive allele. Words can also be used in place of symbols. Parents are shown by horizontal line while their offsprings are connected to it by a vertical line. The offsprings are then shown in the form of a horizontal line below the parents and numbered with arabic numerals.

Question91

ABO blood groups in humans are controlled by the gene I . It has three alleles $-I^4$, I^B and i. since there are three different alleles, six different genotypes are possible. How many phenotypes can occur?
(2010)

Options:

A. Three

B. One

C. Four

D. Two

Answer: C

Solution:

(c): The three alleles I^4, I^B and i of gene I in ABO blood group system can produce six different genotypes and four different phenotypes as shown below:

Genotypes	Phenotypes
I^AI^B, I^Ai	Blood group A
I^BI^B, I^Bi	Blood group B
I^AI^B –	Blood group AB
ii –	Blood group O

Question92

Select the correct statement from the ones given below with respect to dihybrid cross.
(2010)

Options:

A. Tightly linked genes on the same chromosomes show higher recombinations.

B. Genes far apart on the same chromosome show very few recombinations.

C. Genes loosely linked on the same chromosome show similar recombinations.

D. Tightly linked genes on the same chromosome show very few recombinations.

Answer: D

Solution:

Linkage is the phenomenon of certain genes staying together during inheritance through generations without any change or separation due to their being present on the same chromosome. Linked genes occur in the same chromosome. Strength of the linkage between two genes is inversely proportional to the distance between the two i.e., two linked genes show higher frequency of crossing over (recombination) if the distance between them is higher and lower frequency if the distance is small.

Question93

The genotype of a plant showing the dominant phenotype can be determined by
(2010)

Options:

A. test cross

B. dihybrid cross

C. pedigree analysis

D. back cross

Answer: A

Solution:

Solution:
The zygosity of F_1 generation can be checked by test cross method. In a test cross :
The organism with the dominant trait is always crossed with an organism with the recessive trait. If any offspring show the recessive trait, the unknown genotype is heterozygous.If all the offspring have the dominant trait, the unknown genotype is homozygous dominant.Large numbers of offspring are needed for reliable results.

Question94

Which one of the following cannot be explained on the basis of Mendel's law of dominance?
(2010)

Options:

A. The discrete unit controlling a particular character is called a factor.

B. Out of one pair of factors one is dominant, and the other recessive.

C. Alleles do not show any blending and both the characters recover as such in F_2 generation.

D. Factors occur in pairs

Answer: C

Solution:

According to Mendel's law of dominance, in heterozygous individuals a character is represented by two contrasting factors called alleles or allelomorphs which occur in pairs. Out of the two contrasting alleles, only one is able to express its effect in the individual. It is called dominant factor or dominant allele. The other allele which does not show its effect in the heterozygous individual is called recessive factor or recessive allele. The option (c) in the given question cannot be explained on the basis of law of dominance. It can only be explained on the basis of Mendel's law of independent assortment, according to which in a dihybrid cross, the two alleles of each character assort independently (do not show any blending) of the alleles of other character and separate at the time of gamete formation. Both the characters are recovered as such in F_2 generation producing both parental and new combinations of traits.

Question95

ABO blood grouping is controlled by gene I which has three alleles and show co-dominance. There are six genotypes. How many phenotypes in all are possible?
(Mains 2010)

Options:

A. Six

B. Three

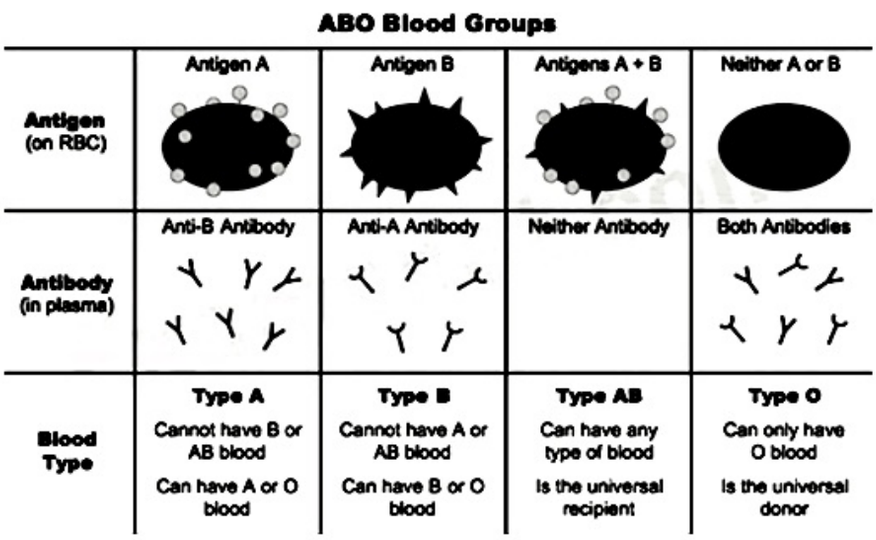
C. Four

D. Five

Answer: C

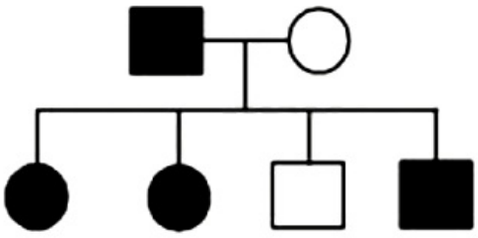
Solution:

There are four main blood groups A, B, AB and O. ABO blood group system is the classification of human blood based on the inherited properties of red blood cells due to the presence or absence of the antigens A and B, which are carried on the surface of the red cells. Thus the correct answer is option C.



Question96

Study the pedigree chart of a certain family given below and select the correct conclusion which can be drawn for the character.



(Mains 2010)

Options:

A. The female parent is heterozygous.

B. The parents could not have had a normal daughter for this character.

C. The trait under study could not be colour blindness.

D. The male parent is homozygous dominant.

Answer: A

Question97

A cross in which an organism showing a dominant phenotype is crossed with the recessive parent in order to know its genotype is called (Mains 2010)

Options:

A. monohybrid cross

B. back cross

C. test cross

D. dihybrid cross

Answer: C

Solution:

A. Test cross- The cross of an organism showing dominant phenotype with the recessive parent to predict the genotype of the test organism.
B. Dihybrid cross- A cross which considers two pairs of contrasting characters.
C. Monohybrid cross- A cross which considers only one pair of contrasting characters.
D. Back cross- The cross of hybrids of F1 generation with either one of the parents.So, the correct answer is 'Test cross'.

Question98

In Antirrhinum two plants with pink flowers were hybridized. The F_1 plants produced red, pink and white flowers in the proportion of 1 red, 2 pink and 1 white. What could be the genotype of the two plants used for hybridization? Red flower colour is determined by RR, and white by rr genes?
(Mains 2010)

Options:

A. rrrr

B. RR

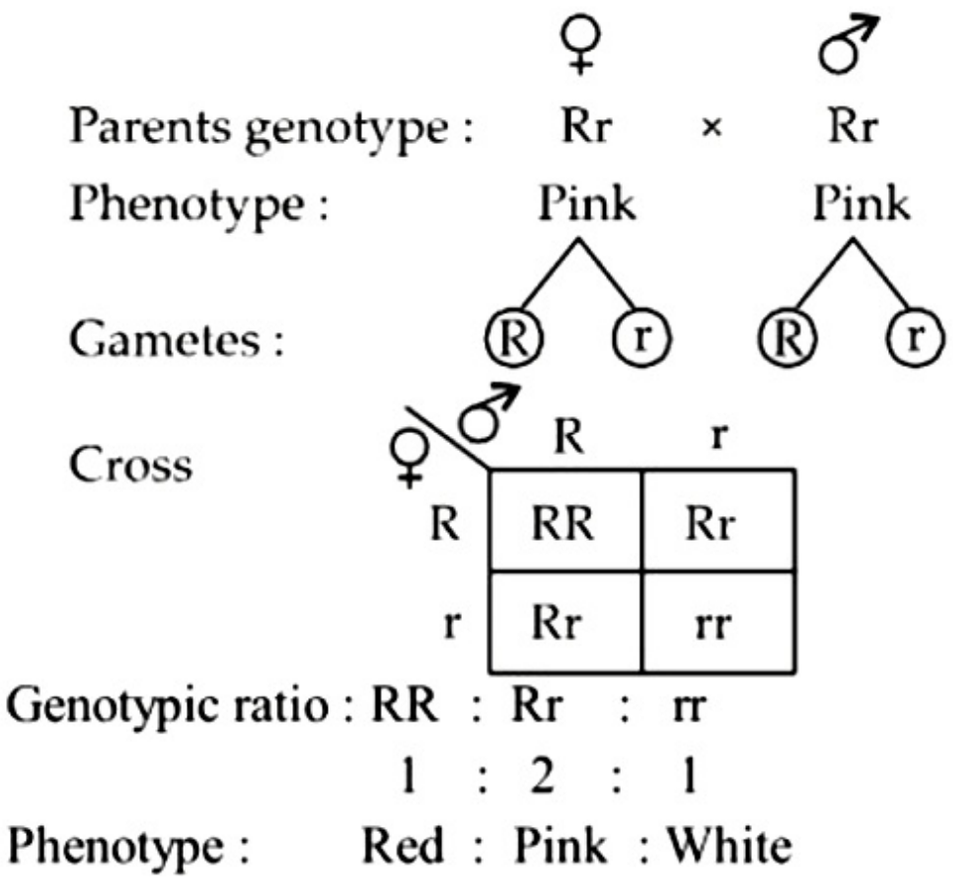
C. Rr

D. rr

Answer: C

Solution:

Solution:
The given situation is an example of incomplete dominance where phenotype found in F_1 generation do not resemble either of the two parents. The genotype of the two plants used for cross will be



The incomplete dominance of dominant allele (here 'R') over recessive allele (here 'r') could be due to mutations (insertion, deletion, substitution or inversion of nucleotides). The mutant allele generally produces a faulty or no product. This modification in the product may lead to incomplete dominance of the (unmodified) wild type dominant allele.

Question99

Select the incorrect statement from the following. (2009)

Options:

A. Galactosemia is an inborn error of metabolism.

B. Small population size results in random genetic drift in a population.

C. Baldness is a sex-limited trait.

D. Linkage is an exception to the principle of independent assortment in heredity.

Answer: C

Solution:

Solution:
Baldness is a sex influenced trait. The dominance of alleles may differ in heterozygotes of the two sexes. This phenomenon is called "sex influenced dominance". Gene products of heterozygotes in the two sexes may be influenced differentially by sex hormones.

Question100

Sickle-cell anaemia is (2009)

Options:

A. caused by substitution of valine by glutamic acid in the beta globin chain of haemoglobin

B. caused by a change in a single base pair of DNA

C. characterized by elongated sickle like RBCs with a nucleus

D. an autosomal linked dominant trait.

Answer: B

Solution:

Solution:
Sickle-cell anaemia is an autosomal hereditary disorder in which erythrocytes become sickle shaped. It is caused by the formation of abnormal haemoglobin called haemoglobin-S. Haemoglobin-S is formed when 6th amino acid of β -chain, i.e., glutamic acid is replaced by valine due to substitution. It occurs due to a single nucleotide change (A → T) in the β -globin gene of coding strand. In the normal β -globin gene the DNA sequence is CCTGAGGAG, while in sicklecell anaemia, the sequence is CCTGIGGAG.

Question101

The genetic defect-adenosine deaminase (ADA) deficiency may be cured permanently by
(2009)

Options:

A. administering adenosine deaminase activators

B. introducing bone marrow cells producing ADA into cells at early embryonic stages

C. enzyme replacement therapy

D. periodic infusion of genetically engineered lymphocytes having functional ADA cDNA.

Answer: B

Solution:

ADA deficiency can be permanently cured if the isolated gene from bone marrow cells producing ADA is introduced into cells at early embryonic stages.

Question102

The most popularly known blood grouping is the ABO grouping. It is named ABO and not ABC, because "O" in it refers to having
(2009)

Options:

A. overdominance of this type on the genes for A and B types

B. one antibody only - either anti - A or anti - B on the RBCs

C. no antigens A and B on RBCs

D. other antigens besides A and B on RBCs.

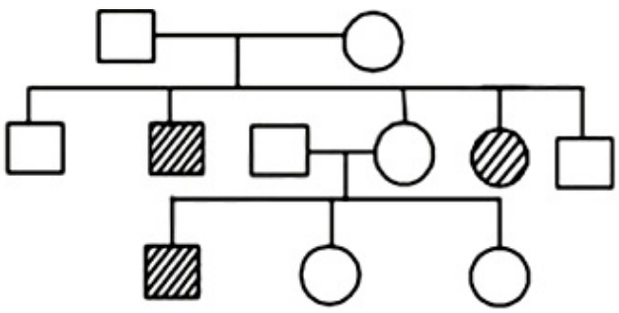
Answer: C

Solution:

Solution:
In ABO blood group O refers to O blood group. It has no antigen (A and B) on RBCs.

Question103

Study the pedigree chart given below. What does it show?



(2009)

Options:

A. Inheritance of a condition like phenylketonuria as an autosomal recessive trait.

B. The pedigree chart is wrong as this is not possible.

C. Inheritance of a recessive sex-linked disease like haemophilia.

D. Inheritance of a sex-linked inborn error of metabolism like phenylketonuria.

Answer: A

Solution:

This chart shows inheritance of an autosomal recessive trait like phenylketonuria. An autosomal recessive trait may skip a generation. It appears in case of marriage between two heterozygous individuals (Aa $\times$Aa = 3Aa + 1 aa), a recessive individual with hybrid (Aa $\times$ aa = 2Aa + 2aa) and two recessive $\times$ aa = all aa). Phenylketonuria is an inborn, autosomal, recessive metabolic disorder in which homozygous recessive individual lacks the enzyme phenylalanine hydroxylase. The heterozygous individuals are normal but carriers.

Question104

Which one of the following conditions in humans is correctly matched with its chromosomal abnormality/linkage?
(2008)

Options:

A. Erythroblastosis foetalis - X-linked

B. Down's syndrome -44 autosomes +X O

C. Klinefelter's syndrome -44 autosomes +X X Y

D. Colour blindness - Y-linked

Answer: C

Solution:

Solution:
Klinefelter's syndrome is a genetic disorder in which there are three sex chromosomes, XXY, rather than the normal XX or XY. The number of autosomes are normal i . e., 44. Affected individuals are apparently male but are tall and thin, with small testes, failure of normal sperm production (azoospermia), enlargement of the breasts (gynaecomastia) and absence of facial and body hairs.

Question105

A human male produces sperms with the genotypes AB, Ab, aB, and ab pertaining to two diallelic characters in equal proportions. What is the corresponding genotype of this person?
(2007)

Options:

A. AaBB

B. AABb

C. AABB

D. AaBb.

Answer: D

Solution:

Solution:
As sperms produced are with genotypes AB, Ab, aB, ab (two diallelic character) the person must be heterozygous for both genes. So his genotype will be AaBb

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Question106

In pea plants, yellow seeds are dominant to green. If a heterozygous yellow seeded plant is crossed with a green seeded plant, what ratio of yellow and green seeded plants would you expect in F_1 generation? (2007)

Options:

A. 9: 1

B. 1: 3

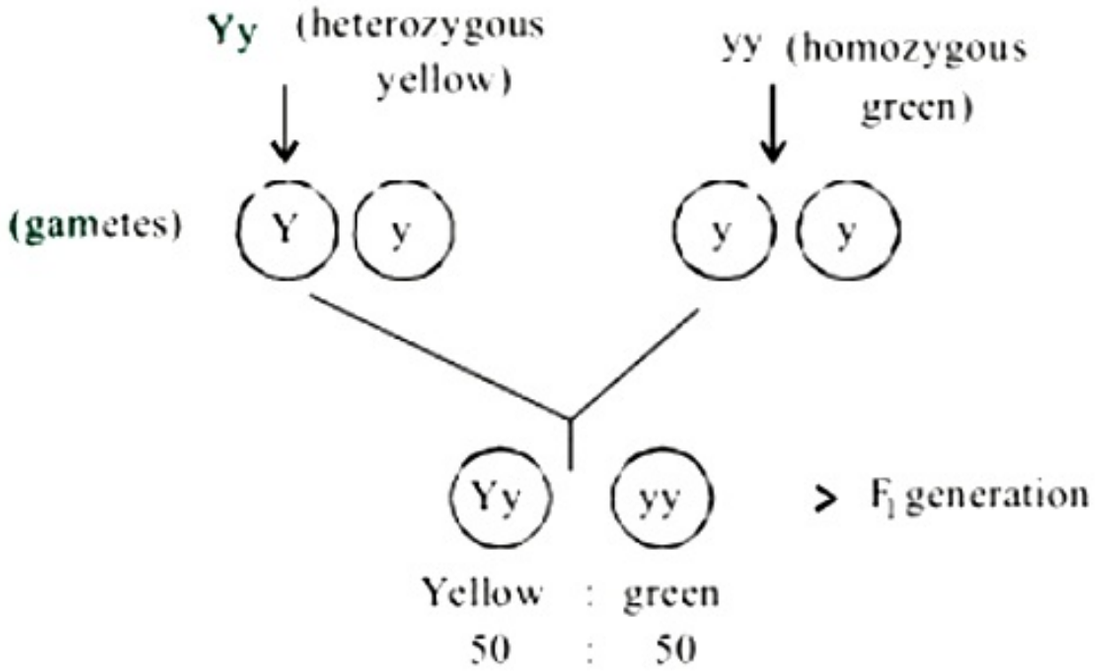
C. 3: 1

D. 50: 50

Answer: D

Solution:

Solution:
Yellow (Y) seeds are dominant to green (y). So a heterozygous yellow seeded plant will have the genotype of $(\mathrm{Y}\,\mathrm{y})$ and a green seeded plant will have genotype of (yy). When the two plants are crossed, the F_1 generation will have the ratio of yellow : green as $50:50$. It is shown as



Question107

Inheritance of skin colour in humans is an example of (2007)

Options:

A. point mutation

B. polygenic inheritance

C. codominance

D. chromosomal aberration

Answer: B

Solution:

Solution:
Polygenic (or Quantitative) inheritance is that type of inheritance in which the complete expression of a trait is controlled by two or more genes in which a dominant allele of each gene contributes only a unit fraction of the trait and total phenotypic expression is the sum total of a additive or cumulative effect of all the dominant alleles of genes\/polygenes. Human skin colour is an example of such polygenic inheritance which is controlled by three pairs of polygenes A, B and C. Negro\/black colour is due to presence of all the six dominant contributing alleles AABBCC. Very light colour or white colour is due to presence of all six recessive non-contributing alleles aabbcc.

Question108

In the hexaploid wheat, the haploid (n) and basic (x) numbers of chromosomes are
(2007)

Options:

A. $n = 21$ and $x = 21$

B. $n = 21$ and $x = 14$

C. $n = 21$ and $x = 7$

D. $n = 7$ and $x = 21$

Answer: C

Solution:

Solution:
Hexaploid wheat is a result of allopolyploidy induced by doubling the chromosome number of the hybrid produced by crossing two different plants. In hexaploid wheat Triticale $2n = 6x = 42$. So x stands for basic chromosome number and n for haploid chromosome number. So, $n = 21$ and $x = 7$ for hexaploid wheat.

Question109

A common test to find the genotype of a hybrid is by
(2007)

Options:

A. crossing of one F_2 progeny with female parent

B. studying the sexual behaviour of F , progenies

C. crossing of one F_1 progeny with male parent

D. crossing of one F_2 progeny with male parent

Answer: C

Solution:

Solution:
A common test to find the genotypes of a hybrid is by crossing of one F_1 progeny with male parent.

Question110

Test cross involves
(2006)

Options:

A. crossing between two genotypes with dominant trait

B. crossing between two genotypes with recessive trait

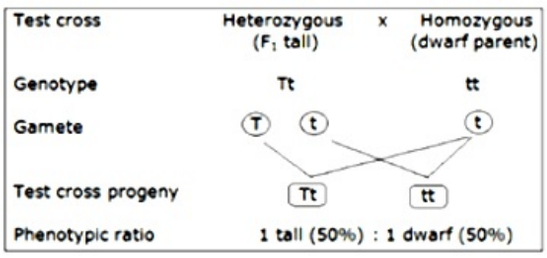
C. crossing between two F hybrids

D. crossing the F_1 hybrid with a double recessive genotype

Answer: D

Solution:

Solution:
The test cross involves the crossing of F1 hybrid with a double recessive genotypic parent.
By test cross, the heterozygocity and homozygocity of the organism can be tested.
Thus, the offspring will be 100% dominant, if the individual which crossed with recessive parent i.e., (tt) was homozygous dominant and ratio will be 50% dominant and 50% recessive so that proves individual was heterozygous dominant. so , answer is option C .



Question111

Both sickle cell anaemia and Huntington's chorea are
(2006)

Options:

A. virus-related diseases

B. bacteria-related diseases

C. congenital disorders

D. pollutant-induced disorders.

Answer: C

Solution:

Solution:
A congenital disorder is a medical condition that is present at birth. Congenital disorders can be a result of genetic abnormalities, the intrauterine environment, or unknown factors. Sickle cell disease [a group of genetic disorders caused by sickle haemoglobin ($H\,b^S$) . $H\,b^S$ molecules tend to clump together, making red blood cells sticky, stiff and more fragile and causing them to form into a curved, sickle shape] and Huntington's chorea (an inherited disorder characterised by

degenerative changes in the basal ganglia structures, which ultimately result in a severely shrunken brain and enlarged ventricles, abnormal body movements called chorea and loss of memory) are congenital disorders.

Question112

If a colour blind woman marries a normal visioned man, their sons will be
(2006)

Options:

A. all colour blind

B. all normal visioned

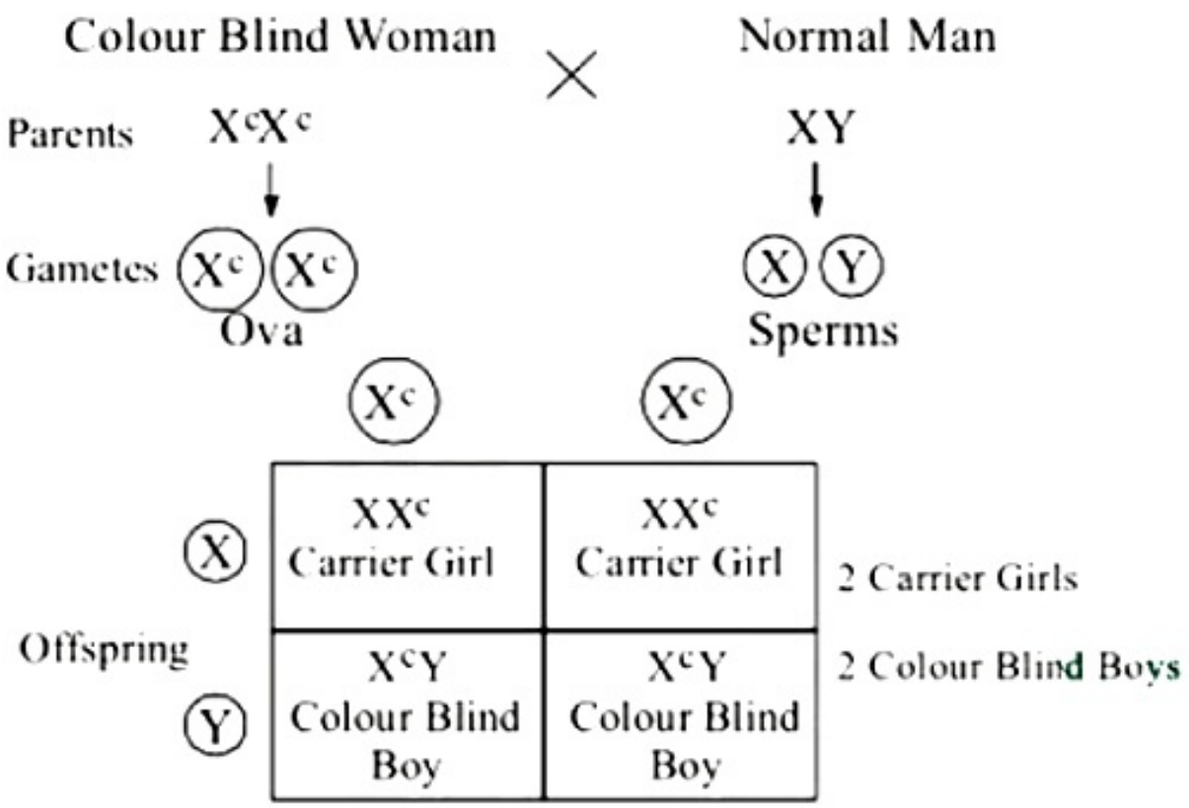
C. one-half colour blind and one-half normal

D. three-fourths colour blind and one-fourth normal

Answer: A

Solution:

Solution:
Colour blindness is a recessive sex-linked trait



All sons will be colour blind and all daughters will be carriers.

Question113

Cri-du-chat syndrome in humans is caused by the (2006)

Options:

A. trisomy of 21 st chromosome

B. fertilization of an XX egg by a normal Y-bearing sperm

C. loss of half of the short arm of chromosome 5

D. loss of half of the long arm of chromosome 5

Answer: C

Solution:

Solution:
Cri-du-chat syndrome, also called deletion 5p syndrome, (or 5p minus), is a rare genetic disorder. Cri-du-chat syndrome is due to a partial deletion of the short arm of chromosome number 5. The name of this syndrome is French for "cry of the cat," referring to the distinctive cry of children with this disorder. The cry is caused by abnormal larynx development, which becomes normal within a few weeks of birth. Infants with cri-du-chat have low birth weight and may have respiratory problems. Some people with this disorder have a shortened lifespan, but most have a normal life expectancy.

Question114

Sickle cell anaemia has not been eliminated from the African population because (2006)

Options:

A. it is controlled by dominant genes

B. it is controlled by recessive genes

C. it is not a fatal disease

D. it provides immunity against malaria.

Answer: D

Solution:

Solution:
Sickle cell anaemia is an autosomal hereditary disorder in which the erythrocytes become sickle shaped. The disorder or disease is caused by the formation of an abnormal haemoglobin called haemoglobin-S. As found out by Ingram (1958), haemoglobin-S differs from normal haemoglobin-A in only one amino acid - 6 th amino acid of β -chain, glutamic acid, is replaced by valine. This is the major effect of the allele. During conditions of oxygen deficiency 6 -valine forms hydrophobic bonds with complementary sites of other globin molecules. It distorts their configuration. As a result, erythrocytes having haemoglobin-S become sickle-shaped. Carriers of the sickle cell anaemia gene are protected against

malaria because of their particular haemoglobin mutation; this explains why sickle cell anaemia is particularly common among people of African origin. The malarial parasite has a complex life cycle and spends part of it in red blood cells and feeds on haemoglobin. Both sickle-cell anaemia and thalassemia are more common in malaria areas, because these mutations convey some protection against the parasite. In a carrier, the presence of the malaria parasite causes the red blood cell to rupture, making the Plasmodium unable to reproduce. Further, the polymerisation of $H\,b$ affects the ability of the parasite to digest $H\,b$ in the first place. Therefore, in areas where malaria is a problem, people's chances of survival actually increase if they carry sickle cell anaemia. Thus, sickle-cell anaemia is a potential saviour from malaria.

Question115

In Mendel's experiments with garden pea, round seed shape (RR) was dominant over wrinkled seeds (rr), yellow cotyledon (YY) was dominant over green cotyledon (yy). What are the expected phenotypes in the F_2 generation of the cross RRYY × myy?
(2006)

Options:

A. Round seeds with yellow cotyledons, and wrinkled seeds with yellow cotyledons

B. Only round seeds with green cotyledons

C. Only wrinkled seeds with yellow cotyledons

D. Only wrinkled seeds with green cotyledons

Answer: A

Solution:

Solution:
since round seed'shape is dominant over wrinkled seed shape and yellow cotyledon is dominant over green cotyledon so RRYY individuals is round yellow and rryy is wrinkled green.
Round yellow seeds × Wrinkled green seeds

$RRY\,Y$ $rryy$

$\downarrow$

F_1 Generation $RrY\,y$

F_2 generation is obtained by selfing F_1

♀ ↓ / ♂ →	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

Question116

How many different kinds of gametes will be produced by a plant having the genotype AABbCC?

(2006)

Options:

A. Two

B. Three

C. Four

D. Nine

Answer: A

Solution:

Solution:
The plant having genotype AABbCC is heterozygous for only one character B. Number of gametes $= 2^n$, where n is the heterozygosity.
since $n = 1$ so 2 gametes will be formed. Those are ABC and AbC

Factor 1	Factor 2	Factor 3	Genotypes of gametes
A	B	C	ABC
		C	ABC
		C	abC
	b	C	AbC
A	B	C	ABC
		C	ABC
	b	C	AbC
		C	AbC

So, the two types of gametes will be ABC and AbC.

Question117

Phenotype of an organism is the result of (2006)

Options:

A. genotype and environment interactions

B. mutations and linkages

C. cytoplasmic effects and nutrition

D. environmental changes and sexual dimorphism

Answer: A

Solution:

Solution:
The external manifestation, morphological or physiological expression of an individual with regard to one or more characters is called phenotype. For recessive genes, phenotype and genotype are similar. For dominant genes, the phenotype is same for both homozygous states. Phenotype is influenced by environment as well as age. A child definitely differs from adolescent, the latter from adult and an adult from aged one. Many phenotypes are determined by multiple genes. Thus, the identity of phenotype is determined by genotype and environment.

Question118

Which one of the following is an example of polygenic inheritance? (2006)

Options:

A. Skin colour in humans

B. Flower colour in Mirabilis jalapa

C. Production of male honey bee

D. Pod shape in garden pea

Answer: A

Solution:

Solution:
Polygenic inheritance occurs when one character is controlled by two or more genes. Often the genes are large in quantity but small in effect. Examples of human polygenic inheritance are height, skin colour, eye colour and weight. So, the correct answer is 'Skin colour in humans'.

Question119

In order to find out the different types of gametes produced by a pea plant having the genotype AaBb it should be crossed to a plant with the genotype
(2005)

Options:

A. AABB

B. AaBb

C. aabb

D. aaBB

Answer: C

Solution:

Solution:
A test cross involving the crossing of F_1 individual with the homozygous recessive parent. It is done to find out homozygous and heterozygous individuals. So AaBb, should be crossed with aabb.

Question120

G-6-P dehydrogenase deficiency is associated with haemolysis of
(2005)

Options:

A. leucocytes

B. lymphocytes

C. platelets

D. RBCs.

Answer: D

Solution:

Solution:
Glucose-6-phosphate dehydrogenase (G-6-PD) deficiency is a group of hereditary abnormalities(X linked disorder) in which the activity of the erythrocyte enzyme G-6-PD is markedly diminished leading to haemolysis.

Question121

A man and a woman, who do not show any apparent signs of a certain inherited disease, have seven children (2 daughters and 5 sons). Three of the sons suffer from the given disease but none of the daughters affected. Which of the following mode of inheritance do you suggest for this disease?
(2005)

Options:

A. Sex-linked dominant

B. Sex-linked recessive

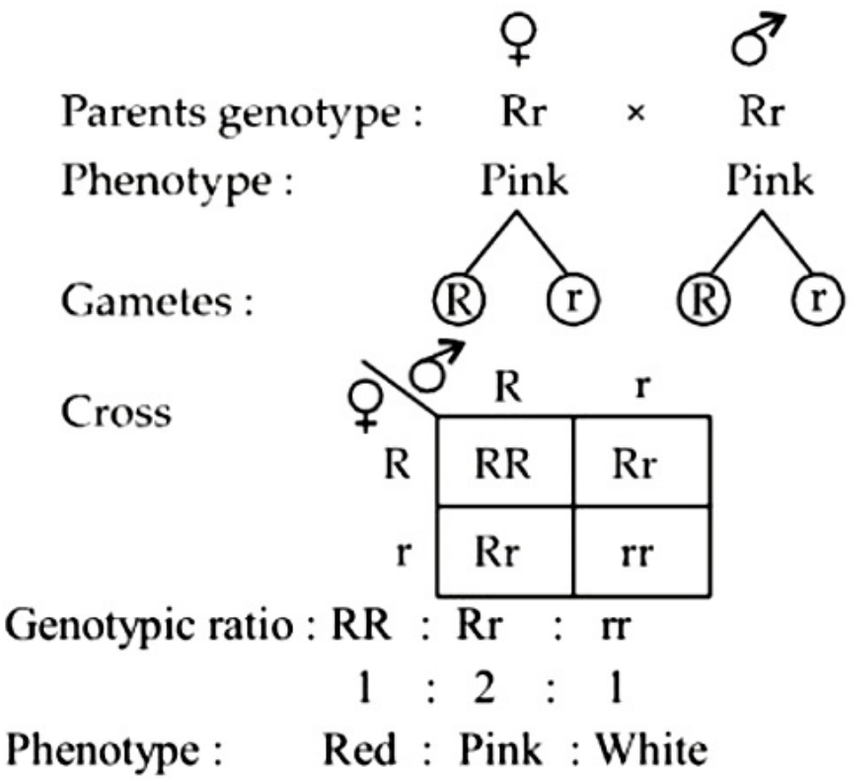
C. Sex-limited recessive

D. Autosomal dominant

Answer: B

Solution:

Traits governed by sex-linked recessive genes are :
(a) produce disorders in males more often than in females,
(b) express themselves in males even when represented by a single allele because Y chromosome does not carry any corresponding alleles,
(c) seldom appear in both father and son,
(d) fail to appear in females unless their father also possesses the same and the mother is a carrier,
(e) female heterozygous for the trait function as carrier and
(f) female homozygous for the recessive trait transfer the trait to all the sons.
Take the example of colour blindness which is a recessive sex-linked trait, In the question, as man and woman do not show any signs of disease, so man must be normal and woman must be carrier.



Question122

A woman with 47 chromosomes due to three copies of chromosome 21 is characterized by
(2005)

Options:

A. superfemaleness

B. triploidy

C. Turner's syndrome

D. Down's syndrome.

Answer: D

Solution:

Down's syndrome is caused by the presence of an extra chromosome number 21. Both the chromosomes of the pair 21 pass into a single egg. Thus, the egg possesses 24 chromosomes instead of 23 and offspring has 47 chromosomes ($45+\mathrm{XY}$ in males, $45+\mathrm{XX}$ in males instead of 46. Turner's syndrome is formed by the union of an abnormal 0 egg and a normal X sperm or a normal egg and an abnormal 0 sperm. The individual has 45 chromosomes ($44+\mathrm{X}$) instead of 46. Female with more than two X chromosomes is called superfemale. Triploidy is a condition in which an organism has three times (3n) the haploid number (n) of chromosomes.

Question123

Haemophilia is more commonly seen in human males than in human females because
(2005)

Options:

A. a greater proportion of girls die in infancy

B. this disease is due to a Y-linked recessive mutation

C. this disease is due to an X-linked recessive mutation

D. this disease is due to an X-linked dominant mutation.

Answer: C

Solution:

Solution:
Haemophilia is an X-linked recessive disease. It occurs due to mutation in gene present on the X chromosome. It is most commonly seen in human males as males have only one copy of X chromosome and only one altered copy of the gene is sufficient to cause the disease. In females, there are two copies of X chromosomes and two altered copies of gene is required to cause the disease. Since it is recessive disease, one copy of altered gene in females will result in carrier state. Thus, the correct answer is option C.

Question124

Which of the following is not a hereditary disease? (2005)

Options:

A. Cystic fibrosis

B. Thalassaemia

C. Haemophilia

D. Cretinism

Answer: D

Solution:

Solution:
Cretinism occurs due to hyposecretion of thyroid hormones. Haemophilia is a sex linked recessive trait. Cystic fibrosis is also a recessive autosomal disorder resulting in mucus clogging in lungs. Thalassemia involves a gene mutation in the polypeptide chains of haemoglobin.

Question125

A woman with normal vision, but whose father was colour blind, marries a colour blind man. Suppose that the fourth child of this couple was a boy. This boy
(2005)

Options:

A. may be colour blind or may be of normal vision

B. must be colour blind

C. must have normal colour vision

D. will be partially colour blind since he is heterozygous for the colour blind mutant allele.

Answer: A

Solution:

Solution:
Colour blindness is a recessive sex-linked trait. since the woman's father was colour blind. She should be carrier of the colour blind gene ($X^{C}X$). When she marries to colour blind man their progeny could be

Parent	$X^{C}X$		×	$X^{C}Y$	
	Carrier woman			Colourblind man	
Progeny	$X^{C}X^{C}$	$X^{C}X$		$X^{C}Y$	XY
	Colour blind girl	Carrier girl		Colour blind son	Normal son

Question126

In a plant, red fruit (R) is dominant over yellow fruit (r) and tallness (T) is dominant over shortness (t). If a plant with RRT t genotype is crossed with a plant that is rrtt,
(2004)

Options:

A. 25% will be tall with red fruit

B. 50% will be tall with red fruit

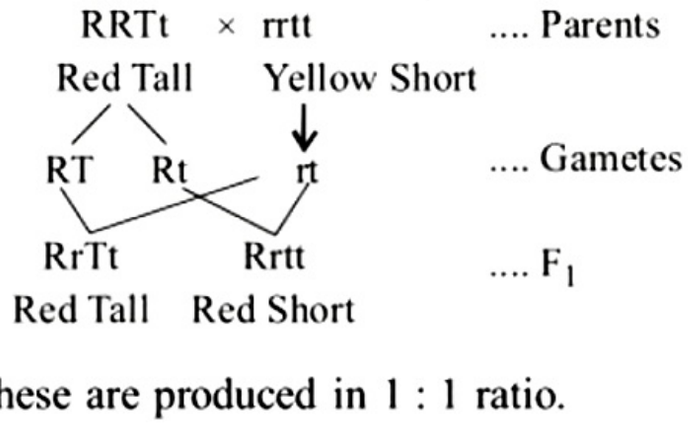
C. 75% will be tall with red fruit

D. all the offspring will be tall with red fruit.

Answer: B

Solution:

Solution:
since red fruit colour is dominant over yellow fruit colour and tallness is dominant overshortness.



These are produced in 1 : 1 ratio.

Question127

A male human is heterozygous for autosomal genes A and B and is also hemizygous for haemophilic gene h. What proportion of his sperms will be abh?
(2004)

Options:

A. 1 / 8

B. 1 / 32

C. 1 / 16

D. 1 / 4

Answer: A

Solution:

Solution:
The male human is heterozygous for autosomal gene A and B and also hemizygous for haemophilic gene h, then his genotype will be $AaBbX^hY$ because haemophilia is a sex linked trait that is present on X -chromosome. So, the total number of gametes will be abX^h, abY , ABX^h, ABY , AbX^h, AbY aB X^h, aBY. So the proportion of abX^h sperm will be 1 / 8

Question128

Lack of independent assortment of two genes A and B in fruit fly Drosophila is due to
(2004)

Options:

A. repulsion

B. recombination

C. linkage

D. crossing over

Answer: C

Solution:

Solution:
Mendel's law of independent assortment states that when the parent differs from each other in two or more pairs of contrasting characters, the inheritance of one pair of factor is independent of the other. For the character to assort independently they should be located on separate non-homologous chromosomes. Genes present on the same chromosome show linkage. It means that these characters remain together and thus low numbers of combinations areformed. This phenomenon is called linkage and such genes are called linked genes. So, A and B are linkedgenes.

Question129

One of the parents of a cross has a mutation in its mitochondria. In that cross, that parent is taken as a male. During segregation of F_2 progenies that mutation is found in
(2004)

Options:

A. one-third of the progenies

B. none of the progemies

C. all the progenies

D. fifty percent of the progenies.

Answer: B

Solution:

Solution:
Mutation is a sudden alteration of the chemical structure of a gene or the alteration of its position on the chromosome by breaking and re-joining of the chromosome. It has occurred in male parent. But organelles like mitochondria, chloroplast etc. are a part of cytoplasmic inheritance.

Cytoplasmic inheritance is the passage of traits from parents to offspring through structures present inside the cytoplasm of contributing gametes. Plasma genes occur in plastids, mitochondria, plasmids and some special particles like kappa particles, sigma particles, etc. In higher organisms cytoplasmic inheritance is called maternal inheritance because the zygote receives most of its cytoplasm from the ovum. Therefore, cytoplasmic inheritance is usually unparental. So none of the progeny will show mutation.

Question130

A normal woman, whose father was colour-blind is married to a normal man. The sons would be (2004)

Options:

A. 75% colour-blind

B. 50% colour-blind

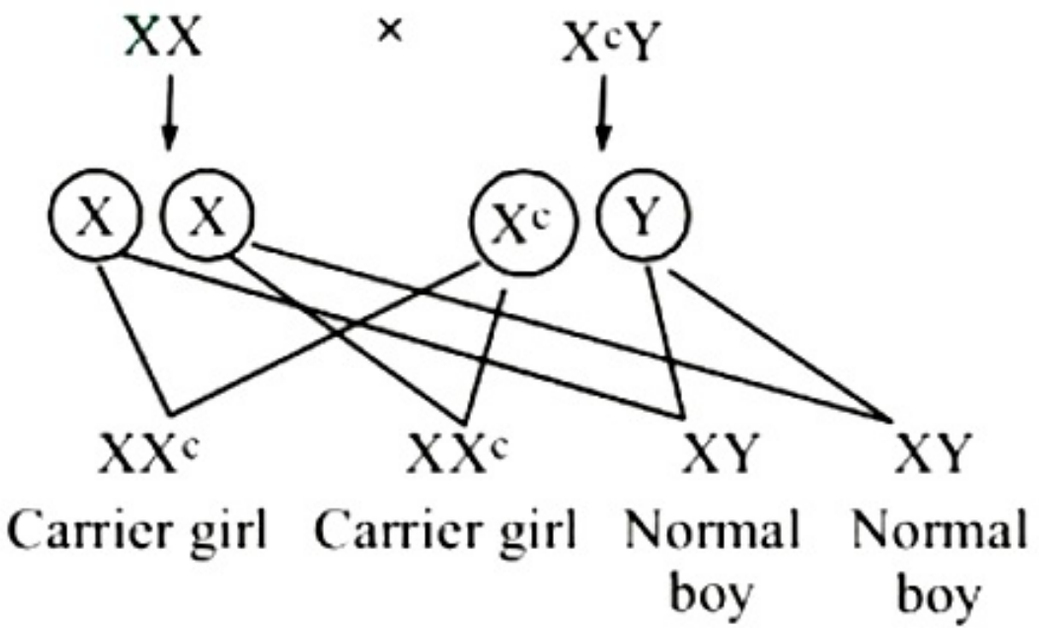
C. all normal

D. all colour-blind

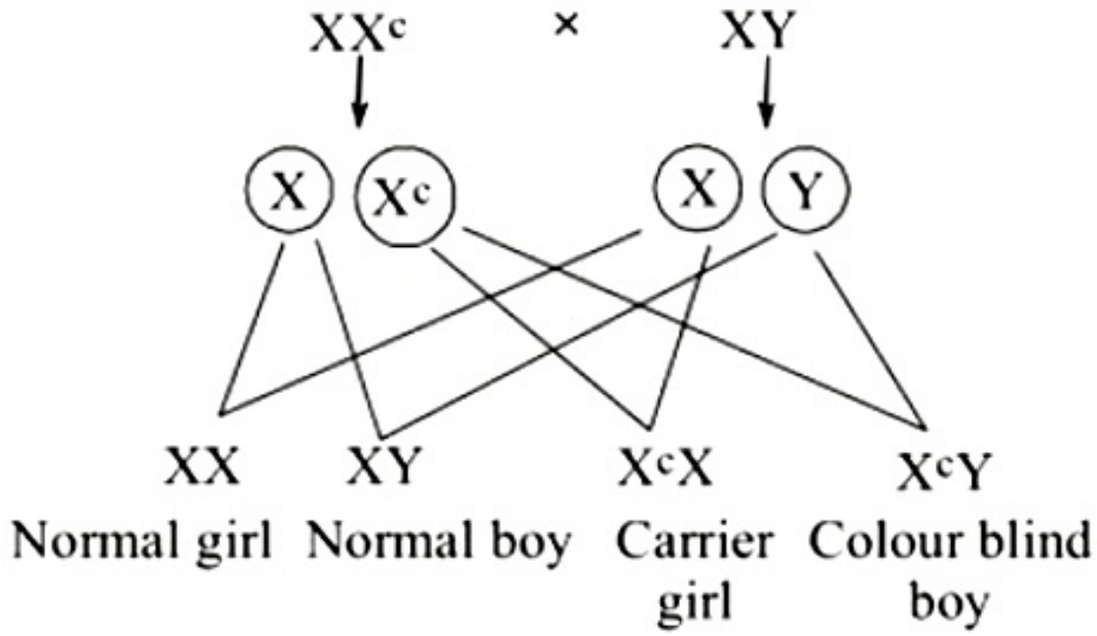
Answer: B

Solution:

Solution:
In question, where the genotype of the other parent is not mentioned then that should be considered normal. Colour blindness is a recessive sex- linkedtrait
(i) To find out the genotype of a woman.
Her father is colour-blind his genotype is X^cY and her mother is normal so her genotype is XX.



So, woman is carrier.
(ii) When this woman marries normal man → 50% of the sons would be colour blind.



Question131

The recessive genes located on X-chromosome humans are always (2004)

Options:

A. lethal

B. sub-lethal

C. expressed in males

D. expressed in females.

Answer: C

Solution:

Solution:
The recessive genes located on X-chromosome of humans are always expressed in males eg., colour blindness is a recessive sex-linked trait in which the eye fails to distinguish red and green colours. The gene for the normal vision is dominant. The normal gene and its recessive allele are carried by X-chromosomes. In females colour blindness appears only when both the sex chromosomes carry the recessive gene ($X^{c}X^{c}$). The females have normal vision but function as carrier if a single recessive gene for colour blindness is present (XX^{c}). However, in human males the defect appears in the presence of a single recessive gene ($X^{c}Y$) because $Y-$ chromosome of male does not carry any gene for colour vision.

Question132

Which one of the following traits of garden pea studied by Mendel was a recessive feature?
(2003)

Options:

A. Axial flower position

B. Green seed colour

C. Green pod colour

D. Round seed shape

Answer: B

Solution:

Solution:
Mendel chose seven pairs of contrasting traits, namely plant height, flower position, pod colour, pod shape, seed colour, seed shape and flower colour. The axial flower position was recessive to the terminal position; green seed colour was recessive to yellow colour; yellow pod colour was recessive to green and wrinkled seed shape was recessive to round shape. The correct answer is B.

Question133

The genes controlling the seven pea characters studied by Mendel are now known to be located on how many different chromosomes?
(2003)

Options:

A. Seven

B. Six

C. Five

D. Four

Answer: D

Solution:

Solution:
Mendel worked on seven characters. These characters showed complete independent assortment despite the seven characters chosen by him were present on four chromosomes -1,4,5 and 7 .

Question134

Two crosses between the same pair of genotypes or phenotypes in which the sources of the gametes are reversed in one cross, is known as (2003)

Options:

A. test cross

B. reciprocal cross

C. dihybrid cross

D. reverse cross.

Answer: B

Solution:

Solution:
A reciprocal cross means that the same two parent are used in two experiments in such a way that if in one experiment A is used as the female parent and B is used as the male parent then in the other experiment A will be used as the male parent and B as the female parent. Thus the sources of gametes are reversed. When the F , individuals obtained in a cross is crossed with the recessive parent, it is called a test cross. When inheritance of two pairs of contrasting character is studied simultaeneously it is called dihybrid cross.

Question135

Pattern baldness, moustaches and beard in human males are examples of (2003)

Options:

A. sex linked traits

B. sex limited traits

C. sex influenced traits

D. sex determining traits.

Answer: C

Solution:

Sex influenced traits are autosomal traits that are influenced by sex. If a male has one recessive allele, he will show that trait, but it will take two recessive alleles for the female to show that same trait e . g. pattern baldness, moustaches and beard in males. Sex linked traits are those traits determining genes of which are found on the sex chromosomes. Sex limited traits are the traits which are expressed in a particular sex though their genes also occur in the other sex e . g.,

milk secretion in mammalian females.

Question136

Which one of the following conditions though harmful in itself, is also potential saviour from a mosquito borne infectious disease? (2003)

Options:

A. Thalassaemia

B. Sickle cell anaemia

C. Pernicious anaemia

D. Leukaemia

Answer: B

Solution:

Solution:
Sickle cell anemia is a blood disease in which the red blood cells possess an abnormal crescent or sickle shape, when observed under microscope. It is an inherited disorder and is attributed to a single base substitution in the DNA sequence of the gene encoding the beta chain of hemoglobin.
The sickle cell trait protects against malaria. In the sickled RBC, malaria parasites can not survive, thus giving advantage to the anaemic patients.So, the correct answer is 'Sickle cell anaemia'

Question137

Down's syndrome is caused by an extra copy of chromosome number 21. What percentage of offspring produced by an affected mother and a normal father would be affected by this disorder? (2003)

Options:

A. 100%

B. 75%

C. 50%

D. 25%

Answer: C

Solution:

Down's syndrome is the example of autosomal aneuploidy. Here, an extra copy of chromosome 21 occurs. As it is an autosomal disease, the offsprings produced from affected mother and normal father should be 50%

Question138

In Drosophila, the sex is determined by (2003)

Options:

A. the ratio of number of X -chromosome to the sets of autosomes

B. X and Y chromosomes

C. the ratio of pairs of X -chromosomes to the pairs of autosomes

D. whether the egg is fertilized or develops parthenogenetically.

Answer: A

Solution:

Solution:
- Drosophila is characterised by sexual dimorphism. Males can also easily be distinguished from females which have variations in size and colour.
- The female's length, however, is approx. Moreover, 2.5 mm, male is slightly smaller than female with darker dorsal sites of the male body due to a separate black patch at the abdomen.- In our understanding of heredity, the sex chromosomes of the Drosophila melanogaster fruit fly have played a especially important role.
- Therefore, it can come as a surprise that a relatively unusual method for deciding sex is used by fruit flies. In Drosophila, sex is mainly determined by the X: A ratio, or the ratio of the number of X chromosomes to the number of autosomal sets (Cline & Meyer, 1996).
- The balance between encoded female-determining factors on the X chromosome and encoded male-determining factors on the autosomes decides the transcription sex-specific pattern will be initiated.
- Thus, females are XX, XXY, and XXYY flies, while males are XY and XO flies. With more than two copies of an X chromosome, flies are unable to survive because of the mechanism they use for dose compensation. Dosage compensation refers to the mechanisms by which animals equalise the amount of gene products in males and females derived from X-linked genes.
- Unlike in mammals, all of the Drosophila X chromosomes remain involved, and by doubling the expression of the X chromosome in males, flies change the levels of X-linked gene products.
- An additional copy of the X chromosome, containing approximately one-third of the fly genes, causes an aneuploid syndrome that substantially disrupts cell balance.

Question139

Which of the following is an example of pleiotropy? (2002)

Options:

A. Haemophilia

B. Thalassemia

C. Sickle cell anaemia

D. Colour blindness

Answer: C

Solution:

Solution:
Pleiotropic gene is such a gene which has a wider effect on phenotype i.e., it controls several phenotypic traits. Sickle cell anaemia is considered to be caused by one such pleiotropic gene. It is caused due to mutation in β -globin gene of haemoglobin.

Question140

There are three genes a, b, c. Percentage of crossing over between a and b is 20%, b and c is 28% and a and c is 8%. What is the sequence of genes on chromosome?
(2002)

Options:

A. b, a, c

B. a, b, c

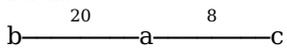
C. a, c, b

D. None of these

Answer: A

Solution:

Solution:
Linkage/ Cross over/ Chromosome maps is a graphic representation of relative positions/ order and relative distances of genes in a chromosome in the form of line like a linear road map depicting different places and their relative distances without giving exact mileage. It is based on Morgan's hypothesis (1911) that frequency of crossing over\/recombination between two linked genes is directly proportional to the physical distance between the two. 1 map unit or centrimorgan is equivalent to 1% recombination between two genes. Percentage of crossing over between a and b is 20% so they are 20 map distance apart and b and c are 28 map distance apart. So, that correct sequence of genes on chromosomes will be as



Question141

On selfing a plant of F - generation with genotype "AABbCC", the genotypic ratio in F_2 -generation will be
(2002)

Options:

A. 3: 1

B. 1: 1

C. 9: 3: 3: 1

D. 27: 9: 9: 9: 3: 3: 3: 1

Answer: A

Solution:

Solution:
Selfing is the process of fertilisation with polar or male gametes of the same individual. AABbCC will produce two type of gametes ABC and AbC. Thus, in F_2 generation three genotypes will be obtained. These are AABBCC, AABbCC and AAbbCC in the ratio of $1:2:1$. Phenotypically AABBCC and AABbCC are same. So the phenotypic ratio in F_2 generation will be 3: 1 .

Question142

A gene is said to be dominant if (2002)

Options:

A. it expresses it's effect only in homozygous state

B. it expresses it's effect only in heterozygous condition

C. it expresses it's effect both in homozygous and heterozygous condition.

D. it never expresses it's effect in any condition.

Answer: C

Solution:

Solution:
Dominant factor is an allele or Mendelian factor which expressess itself in the hybrid (heterozygous) as well as in homozygous state. It is denoted by capital letter.

Question143

A diseased man marries a normal woman. They get three daughters and five sons. All the daughters were diseased and sons were normal. The gene of this disease is (2002)

Options:

A. sex linked dominant

B. sex linked recessive

C. sex limited character

D. autosomal dominant

Answer: A

Solution:

Solution:
In the inheritance pattern of sex chromosomes X-chromosome of father always passes to daughter and X -chromosome of mother passes to son. As the father is diseased and all the girls inherit it, it is obvious the disease is sex-linked. The mother is not a carrier (as evident from the fact that no son is diseased). Thus, the gene is dominant and expresses even in heterozygous condition.

Question144

Which of the following is a correct match? (2002)

Options:

A. Down's syndrome -21^{st} chromosome

B. Sickle cell anaemia - X-chromosome

C. Haemophilia Y-chromosome

D. Parkinson's disease - X and Y chromosome.

Answer: A

Solution:

Solution:
Down's syndrome (Mongolian Idiocy, Mongolism) is caused by the presence of an extra chromosome number 21. Sickle cell anaemia is not a sex linked ($i.e.$, X linked) disease but an autosomally inherited recessive trait. Haemophilia is X-linked but not holandric\/Y-linked. Parkinson's disease is a degenerative disease. It is not at all hereditary.

Question145

Two nonallelic genes produces the new phenotype when present together but fail to do so independently then it is called (2001)

Options:

A. epistasis

B. polygene

C. non complementary gene

D. complementary gene.

Answer: A

Solution:

Solution:
Epistasis is the phenomenon of suppression of phenotypic expression of gene by a non-allelic gene which shows its own effect The gene which masks the effect of another is called epistatic gene while the one which is suppressed is termed hypostatic gene. Epistasis is of three types - dominant, recessive and dominant-recessive.

Question146

A and B genes are linked. What shall be genotype of progeny in a cross between AB / ab and ab / ab?
(2001)

Options:

A. AAbb and aabb

B. AaBb and aabb

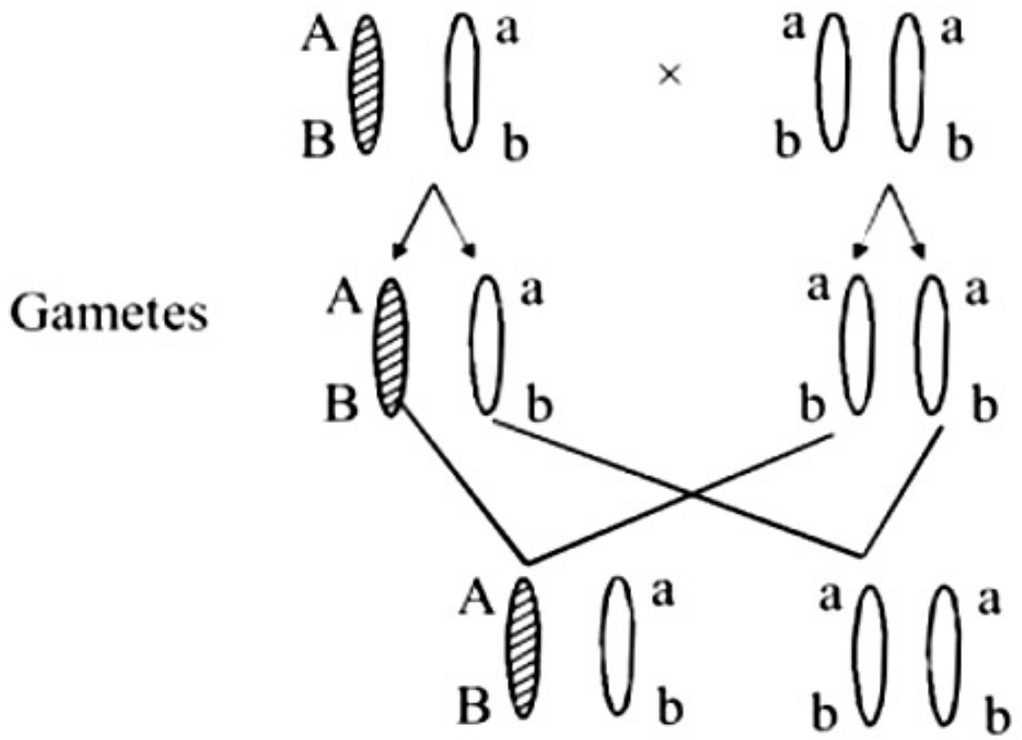
C. AABB and aabb

D. None of the above

Answer: B

Solution:

Solution:
The tendency of potential combinations to remain together, which is expressed in terms of low frequency of recombinations (new combinations) is called linkage. Genes present on same chromosomes show linkage. These genes are called linked genes. since A and B genes are linked they will be passed on together in the progeny.



Question147

When dominant and recessive alleles express itself together it is called (2001)

Options:

A. co-dominance

B. dominance

C. amphidominance

D. pseudo dominance

Answer: A

Solution:

Solution:
Co-dominance: A condition in which both alleles of a gene pair in a heterozygote are fully expressed, with neither one being dominant or recessive to the other. Codominance is a relationship between two versions of a gene. Individuals receive one version of a gene, called an allele, from each parent. If the alleles are different, the dominant allele usually will be expressed, while the effect of the other allele, called recessive, is masked.

Question148

Ratio of complementary genes is (2001)

Options:

A. 9: 3: 4

B. 12: 3: 1

C. 9: 3: 3: 4

D. 9: 7

Answer: D

Solution:

Solution:
If two genes present on different loci produce the same effect when present alone but interact to form a new trait when present together, they are called complementary genes. The F_2 ratio is modified to 9: 7 instead of 9: 3: 3: 1 .

Question149

Independent assortment of genes does not takes place when (2001)

Options:

A. genes are located on homologous chromosomes

B. genes are linked and located on same chromosome

C. genes are located on non-homogenous chromosome

D. all of these.

Answer: B

Solution:

Solution:
According to law of independent assortment, the two factors of each trait assort at random and independent of the factors of other traits at the time of meiosis and get randomly as well as independently rearranged in the offspring. Principle of law of independent assortment is applicable to only those factors or genes which are present on different chromosomes.

Question150

Sickle cell anaemia induce to (2001)

Options:

A. change of amino acid in α-chain of haemoglobin

B. change of amino acid in β-chain of haemoglobin

C. change of amino acid in both α and β chains of haemoglobin

D. change of amino acid either α or β chains of haemoglobin.

Answer: B

Solution:

Solution:
Sickle cell anemia is an inherited disease. People who have the disease inherit two genes for sickle hemoglobin, one from each parent.
Sickle hemoglobin causes red blood cells to develop a sickle, or crescent, shape. Sickle cells are stiff and sticky. They tend to block blood flow in the blood vessels of the limbs and organs. Blocked blood flow can cause pain and organ damage. It can also raise the risk for infection.
The gene defect is a known mutation of a single nucleotide (A to T) of the β-globin gene, which results in Glutamic acid being substituted by Valine at position 7. The genetic disorder is due to the mutation of a single nucleotide, from a GAG to GTG codon on the coding strand, which is transcribed from the template strand into a GUG codon.

Question151

Number of Barr bodies in XXXX female is (2001)

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

Solution:
Barr body is a mass of condensed sex chromatin in the nuclei of normal female somatic cells due to inactive X chromosome. Whenever the number of X -chromosomes is two or more than two, the number of barr bodies is one less than the number of X-chromosomes. Therefore, the number of barr bodies in XXXX female is three

Question152

Male XX and female XY sometime occur due to (2001)

Options:

A. deletion

B. transfer of segments in X and Y chromosome

C. aneuploidy

D. hormonal imbalance

Answer: B

Solution:

Solution:
Male XX and female XY sometimes occur due to transfer of segments in X and Y chromosomes. Deletion is the loss of an intercalary segment of a chromosome which is produced by a double break in the chromosomes followed by the union of remaining parts. Aneuploidy is a condition of having fewer or extra chromosomes than the normal genome number of the species.

Question153

Probability of four sons to a couple is (2001)

Options:

A. 1 / 4

B. 1 / 8

C. 1 / 16

D. 1 / 32

Answer: C

Solution:

Solution:
There are two possibilities to a couple for their child, that is either son or daughter. Probability of having either sex is $\frac{1}{2}$.

The probability for each child is independent of each other. Hence, the probability of four sons to a couple is $\left(\frac{1}{2}\right)^{\mathrm{n}}$, where n is the number of children.

Probability of four sons $= \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$
Hence, the correct answer is option C.

Question154

Due to the cross between TTRr times ttrr the resultant progenies show what percent of tall, red flowered plants (2000)

Options:

A. 50 %

B. 75 %

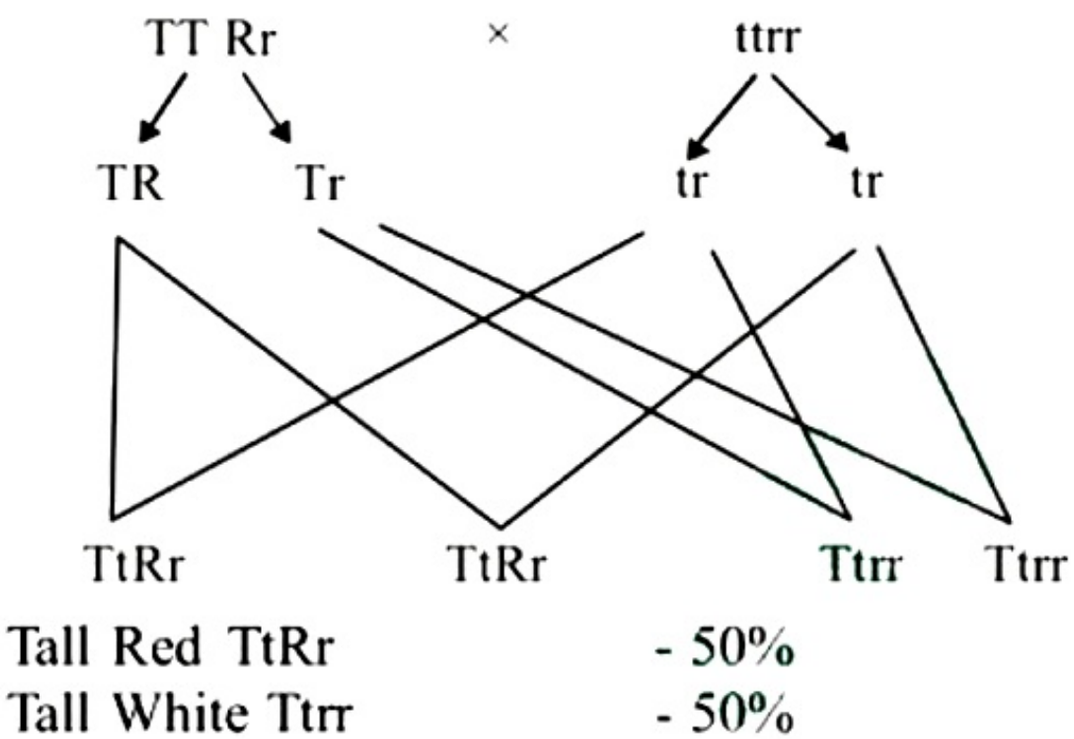
C. 25 %

D. 100 %

Answer: A

Solution:

The cross can be represented as :



Question155

According to Mendelism, which character shows dominance? (2000)

Options:

A. Terminal position of flower

B. Green colour in seed coat

C. Wrinkled seeds

D. Green pod colour

Answer: D

Solution:

Solution:
Through the selective cross-breeding of common pea plants (Pisum sativum) over many generations, Mendel discovered that certain traits show up in offspring without any blending of parent characteristics. Mendel observed seven traits that are easily recognized and apparently only occur in one of two forms.
They are :
1. Flower colour - Purple and white.
2. Flower position - Axil and terminal
3. Stem length - Long and short
4. Seed shape - Round and Wrinkled
5. Seed colour - Yellow and Green
6. Pod shape - Inflated and constricted
7. Pod colour - Yellow and Green

Question156

Mongolian Idiocy due to trisomy in 21^{st} chromsome is called (2000)

Options:

A. Down's syndrome

B. Turner's syndrome

C. Klinefelter's syndrome

D. Triple X syndrome

Answer: A

Solution:

Solution:
Trisomy mainly exists due to one extra copy of chromosome which is caused due to certain mutation or by non-

disjunction of homologous chromosomes during cell division. The term Mongolian idiocy have been used to refer to a specific type of mental deficiency associated with the genetic disorder, more commonly referred to as Down syndrome.Therefore, the correct answer is option A.

Question157

Erythroblastosis foetalis is caused when fertilization takes place between gametes of
(2000)

Options:

A. Rh^- female and Rh^+ male

B. Rh^+ female and Rh^- male

C. Rh^+ female and Rh^- male

D. Rh^- female and Rh^- male

Answer: A

Solution:

Solution:
(a): If fertilization takes place between gametes of Rh^- female and Rh^+ male then the resulting foetus' blood is Rh^+. The Rh^+ blood of the foetus stimulates the formation of anti Rh factors in the mother's blood. In second pregnancy (with Rh^+ foetus), the anti Rh factors of the mother's blood destroy the foetal red blood corpuscles. This is called erythroblastosis foetalis. New born may survive but it is often anaemic. The Rh^- child does not suffer.

Question158

In Drosophila the XXY condition leads to femaleness whereas in human beings the same condition leads to Klienfelter's syndrome in male. It proves
(2000)

Options:

A. in human beings Y chromosme is active in sex determination

B. Y chromosome is active in sex determination in both human beings and Drosophila

C. in Drosophila Y chromosome decides femaleness

D. Y chromosome of man have genes for syndrome.

Answer: A

Solution:

Y-chromosome does not play any role in determination of sex in Drosophila. In human being, XXY is phenotypically male with underdeveloped testes, gynecomastia and often mental retardation. It is caused by the union of a non-disjunct XX egg and sperm and a normal X egg and abnormal XY sperm. This indicates that in human being Y chromosome is active in sex determination.

Question159

A gene pair hides the effect of another gene. The phenomenon is called (1999)

Options:

A. dominance

B. segregation

C. epistasis

D. mutation.

Answer: C

Question160

In hybridization, T t× tt gives rise to the progeny of ratio (1999)

Options:

A. 2: 1

B. 1: 2: 1

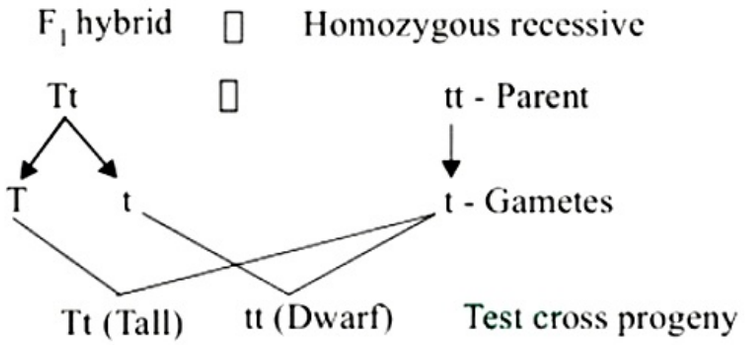
C. 1: 1

D. 1: 2

Answer: C

Solution:

Solution:
Crossing of individuals having dominant phenotype with its homozygous recessive is a test cross, which can be represented as:



Thus, ratio of progeny is = 1:1

Question161

A marriage between normal visioned man and colour blind woman will produce offspring
(1999)

Options:

A. colour blind sons and 50% carrier daughter

B. 50% colour blind sons and 50% carrier daughter

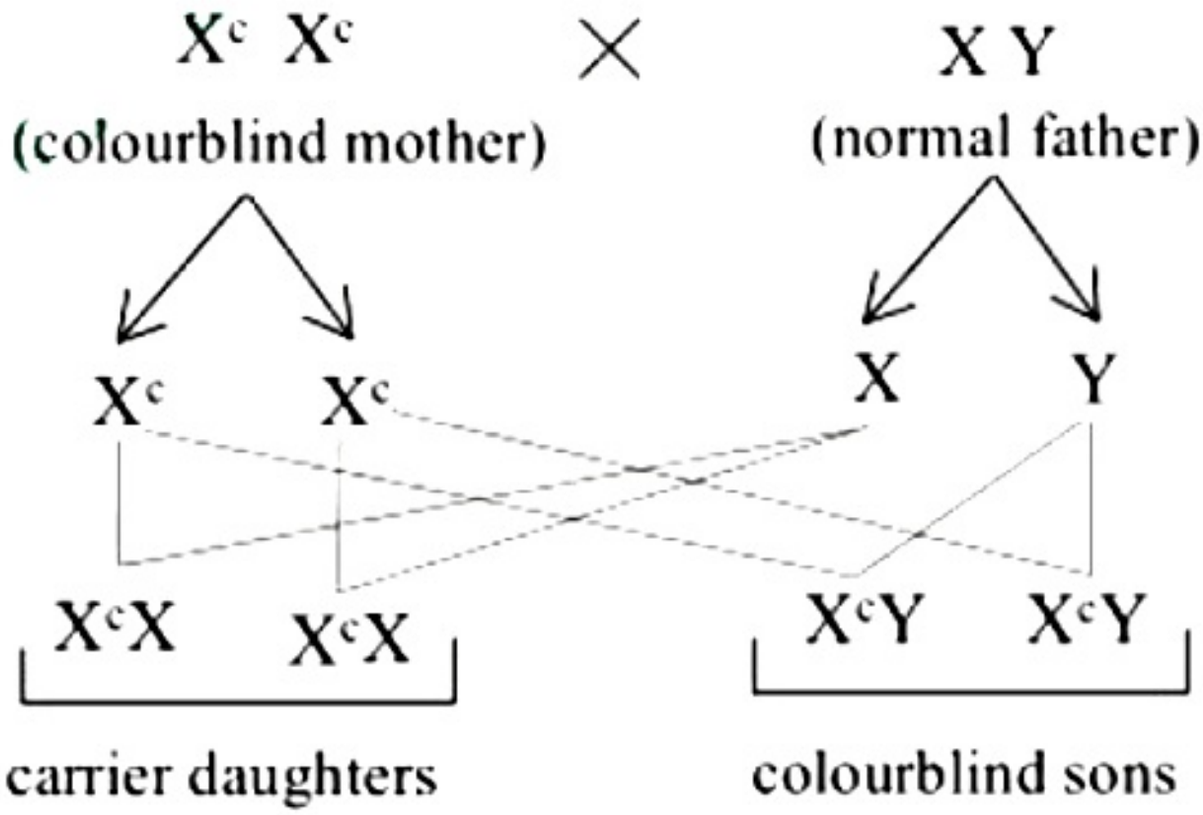
C. normal males and carrier daughters

D. colour blind sons and carrier daughters

Answer: D

Solution:

Solution:
Colour blindness is produced by a recessive gene which lies on X chromosome. A marriage between normal visioned man (XY) and colour blind women ($X X^c$), results in colour blind sons ($X^c Y^c$) and carrier daughters ($X X^\circ$)



Question162

The problem, due to Rh^- factor arises when the blood of two (Rh^+ right. and left . Rh^-) mix up
(1999)

Options:

A. during pregnancy

B. in a test tube

C. through transfusion

D. both (a) and (c)

Answer: D

Solution:

A protein named as rhesus antigen, is present on the surface of red blood corpuscles. Persons having this rhesus antigen (Rh factor) are called Rh positive (Rh^+). Others who do not have this factor are known as Rh negative (Rh^-). Both Rh^+ and Rh^- individuals are phenotypically normal. The problem arises during blood transfusion and pregnancy.
The first blood transfusion of Rh^+ blood to the person with Rh^- blood causes no harm because the Rh^- person develops anti Rh factors or antibodies in his\/her blood. In second blood transfusion of Rh^+ blood to the Rh^- person, the latter's

anti Rh factors attack and destroy the red blood corpuscles of the donor. If father's blood is Rh^+, mother's blood is Rh^- and foetus' blood is Rh^+. Then in second pregnancy (with Rh^+ foetus), the anti Rh factors of the mother's blood destroy the fetal red blood corpuscles.

Question163

Haemophilic man marries a normal woman. Their offsprings will be (1999)

Options:

A. all haemophilic

B. all boys haemophilic

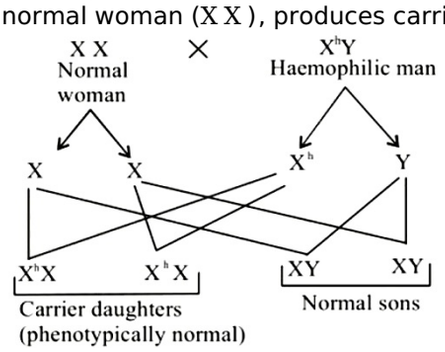
C. all girls haemophilic

D. all normal

Answer: D

Solution:

Solution:
Haemophilia is caused by a recessive gene located in the X -chromosome. When a haemophilic $man(X^hY)$ marries a normal woman (XX), produces carrier girls (XX^h) and normal boys (XY), i.e. all their offsprings will be normal.



Question164

In human beings, multiple genes are involved in the inheritance of (1999)

Options:

A. sickle-cell anaemia

B. skin colour

C. colour blindness

D. phenylketonuria.

Answer: B

Solution:

Skin colour is an example of multiple genic inheritance. It is also called as pleiotropism

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Question165

When a single gene influences more than one trait it is called (1998)

Options:

A. pseudodominance

B. pleiotropy

C. epistasis

D. none of these

Answer: B

Solution:

Solution:
The ability of a gene to have multiple phenotypic effect because it influences a number of characters simultaneously is known as pleiotropy.

Question166

If Mendel had studied the seven traits using a plant with 12 chromosomes instead of 14, in what way would his interpretation have been different?
(1998)

Options:

A. He would not have discovered the law of independent assortment.

B. He would have discovered sex linkage.

C. He could have mapped the chromosome.

D. He would have discovered blending or incomplete dominance

Answer: A

Solution:

According to principle of independent assortment, the two factors of each trait assort at random and independent of the factors of other traits at the time of meiosis and get randomly as well as independently rearranged in the offspring.

Priniciple of independent assortment is applicable to only those factors or genes which are present on different chromosomes. Chromosome have hundreds of genes which show linked inheritance or linkage. Linkage is the phenomenon of certain genes (present on the same chromosome) to remain together and get inherited through generations. The seven characters that Mendel choose were present on 14 chromosomes and so they did not show linkage but if present on 12 chromosomes they would have shown linkage and the principle of independent assortment would not have been discovered.

Question167

Crossing over in diploid organism is responsible for (1998)

Options:

A. segregation of alleles

B. recombination of linked alleles

C. dominance of genes

D. linkage between genes

Answer: B

Solution:

Solution:
Crossing over is the reciprocal exchange of segments between non-sister chromatids of a pair of homologous chromosomes. It results in recombination of genes.

Question168

How many different types of genetically different gametes will be produced by a heterozygous plant having the genotype AABbCc? (1998)

Options:

A. Six

B. Nine

C. Two

D. Four

Answer: D

Solution:

Number of gametes = $2^n = 2^2 = 4$
where n is the number of gene in heterozygous form. The four gametes formed will be →ABc, AbC, Abc and ABC.

Question169

A woman with two genes for haemophilia and one gene for colour blindness on one of the ˚X´ chromosomes marries a normal man. How will the progeny be?
(1998)

Options:

A. 50% haemophilic colour-blind sons and 50% normal sons

B. 50% haemophilic daughters (carrier) and 50% colour blind daughters (carrier)

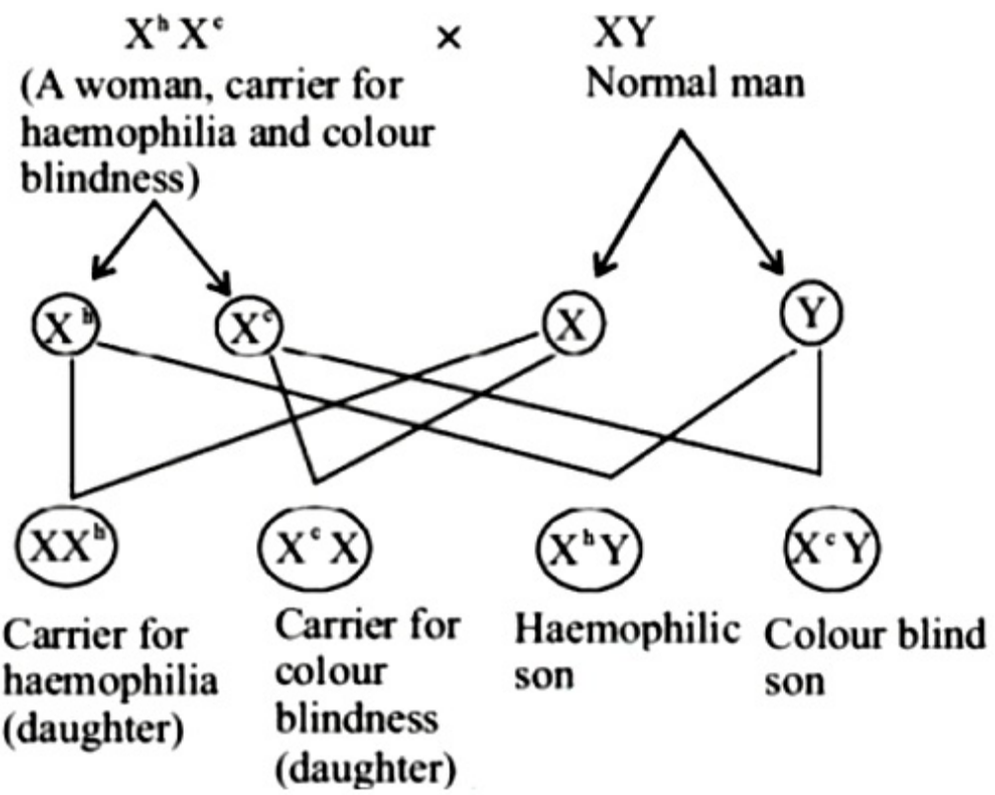
C. All sons and daughters haemophilic and colour-blind

D. Haemophilic and colour-blind daughters

Answer: B

Solution:

Solution:
Both diseases are produced by a recessive gene which lies on the X-chromosomes. A woman having both gene for haemophilia on one Xchromosome and gene for colour blindness on another X-chromosome will have genotype X^hX^c



Thus, progeny includes 50% haemophilic daughters (carrier) and 50% colour blind daughters (carrier).

Question170

Mental retardation in man, associated with sex chromosomal abnormality is usually due to (1998)

Options:

A. moderate increase in Y complement

B. large increase in Y complement

C. reduction in X complement

D. increase in X complement

Answer: D

Solution:

In humans, sex chromosomal abnormality is due to gene carried on X -chromosome. Increase in X-complement leads to Klinefelter's syndrome. Klinefelter's syndrome, 47, XXY or XXY syndrome is a condition caused by a chromosome aneuploidy. Affected males have an extra X sex chromosome. It is formed by the union of an XX egg and normal Y sperm or normal X egg and abnormal XY sperm. Affected males are almost always effectively sterile, although advanced reproductive assistance is sometimes possible and some degree of language learning impairment and mental retardation may be present. In adults, possible characteristics vary widely and include little to no signs of affectedness, a lanky, youthful build and facial appearance, or a rounded body type with some degree of gynecomastia (increased breast tissue).

Question171

Albinism is known to be due to an autosomal recessive mutation. The first child of a couple with normal skin pigmentation was an albino. What is the probability that their second child will also be an albino? (1998)

Options:

A. 50%

B. 75%

C. 100%

D. 25%

Answer: D

Solution:

Albinism is caused by the absence of the enzyme tyrosinase which is essential for the synthesis of the pigment from dihydroxy-phenyl-alanine. The gene for albinism (a) does not produce the enzyme tyrosinase but its normal allele (A) does. Thus, only homozygous individual (aa) is affected by this disease. Albinos (individuals with albinism) lack dark pigment melanin in the skin, hair and iris. Although albinos have poor vision yet they lead normal life. On the basis of principles of simple recessive inheritance, the probability of albinic child from a normally pigmented parents, will be 1 / 4 or 25%.

Question172

A fruit fly is heterozygous for sex-linked genes, when mated with normal female fruit fly, the males specific chromosome will enter egg cell in the proportion
(1997)

Options:

A. 3: 1

B. 7: 1

C. 1: 1

D. 2: 1

Answer: C

Solution:

The female Drosophila possesses two homomorphic sex chromosomes (X X) and the male Drosophila contains two heteromorphic sex chromosomes (X Y). The differential or nonhomologous region of Y-chromosome is mostly heterochromatic. The female parent produces only one type of eggs (22 + X). The male parent produces two types of gametes (22 + Y) and (22 + X). They are produced in equal proportions. As the two types of sperms are produced in equal proportions, there are equal chances of getting a male or female fly in a particular mating.

Question173

A person with the sex chromosomes XXY suffers from
(1997)

Options:

A. gynandromorphism

B. Klinefelter's syndrome

C. Down's syndrome

D. Turner's syndrome

Answer: B

Solution:

Klinefelter syndrome is a genetic condition that results when a boy is born with an extra copy of the X chromosome. Klinefelter syndrome may adversely affect testicular growth, resulting in smaller than normal testicles, which can lead to lower production of testosterone. The syndrome may also cause reduced muscle mass, reduced body and facial hair, and enlarged breast tissue.
So, the correct answer is 'Klinefelter's syndrome'.

Question174

Genetic identity of a human male is determined by (1997)

Options:

A. sex-chromosome

B. cell organelles

C. autosome

D. nucleolus

Answer: A

Solution:

Sex chromosomes are those chromosomes whose presence, absence or particular form determines the sex of the individual in unisexual or dioecious organisms, $e.g., XX-XY.XY$ method $(XX-XY)$ Despite differences in morphology, XY chromosomes synapse during zygotene. They have two parts, homologous and differential. Homologous regions of the two take part in synapsis.

Question175

The polygenic genes show (1996)

Options:

A. different karyotypes

B. different genotypes

C. different phenotypes

D. none of these

Answer: C

Solution:

Solution:
A polygene, multiple factor, multiple gene inheritance, or quantitative gene is a group of non-allelic genes that together influence a phenotypic trait. Polygenic inheritance occurs when one characteristic is controlled by two or more genes. Often the genes are large in quantity but small in effect. Examples of human polygenic inheritance are height, skin color, eye color and weight. Polygenes exist in other organisms, as well. Drosophila, for instance, display polygeny with traits such as wing morphology, bristle count and many others.

Question176

When two dominant independently assorting genes react with each other, they are called
(1996)

Options:

A. collaborative genes

B. complementary genes

C. duplicate genes

D. supplementary genes

Answer: B

Solution:

Complementary genes are those non-allelic genes which independently show a similar effect butproduce a new trait when present together in the dominant form. Supplementary genes are a pair of nonallelic genes, one of which produces its effectindependently in the dominant state while the dominant allele of the second gene is without any independent effect but is able to modify the effect of the former to produce a new trait. Duplicate genes are independent genes producing the same or similar effect.

Question177

In which of the following diseases, the man has an extra X-chromosome? (1996)

Options:

A. Turner's syndrome

B. Klinefelter's syndrome

C. Down's syndrome

D. Haemophilia

Answer: B

Solution:

Solution:
Klinefelter syndrome is a sex chromosome disorder in boys and men that results from the presence of an extra X chromosome in cells. People typically have 46 chromosomes in each cell, two of which are the sex chromosomes. Females have two X chromosomes (46,XX), and males have one X and one Y chromosome (46,XY). Most often, boys and men with Klinefelter syndrome have the usual X and Y chromosomes, plus one extra X chromosome, for a total of 47 chromosomes (47,XXY). Boys and men with Klinefelter syndrome have an extra copy of multiple genes on the X chromosome. The activity of these extra genes affects many aspects of development, including sexual development before birth and at puberty.
So, the correct answer is 'Klinefelter's syndrome'.

Question178

A person whose father is colour blind marries a lady whose mother is daughter of a colour blind man. Their children will be (1996)

Options:

A. all sons colour blind

B. some sons normal and some colour blind

C. all colour blind

D. all daughters normal.

Answer: B

Question179

A genetically diseased father (male) marries with a normal female and gives birth to 3 carrier girls and 5 normal sons. It may be which type of genetic disease?
(1996)

Options:

A. Sex-influenced disease

B. Blood group inheritance disease

C. Sex-linked disease

D. Sex-recessive disease

Answer: C

Solution:

Solution:
It is a sex-linked disease. It is a disease which occurs due to gene responsible for determining the character concerned and is carried on a sex chromosome. In humans, this is always X-chromosome e.g. colourblindness. Here a genetically diseased father (male) marries with a normal female (homozygous). Colour blindness is recessive to normal vision so that the sons produced would be normal, but daughters will be heterozygous (normal phenotype), which means that these daughters will be carriers of this trait

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Question180

When two genetic loci produce identical phenotypes in cis and trans position, they are considered to be
(1995)

Options:

A. multiple alleles

B. the parts of same gene

C. pseudoalleles

D. different genes.

Answer: C

Solution:

Solution:
E.B. Lewis in 1951 reported from a cross of apricot eyed and white eyed flies in Drosophila, he obtained F_1, having intermediate eye colour. In F_2, he had expected segregation only for apricot and white, but he recovered very low frequency of wild type. since those alleles behaved as non-alleles, Lewis preferred to call them pseudoalleles and the phenomenon as pseudoallelism. In pseudoallelism, in cis position both the mutant alleles are on one chromosome. So the other chromosome will be normal and will be able to produce the end result. But in trans position the sequence of steps involved in synthesis will be interrupted due to mutations on either of the two homologous chromosomes thus leading to a mutant phenotype.

Question181

The phenomenon, in which an allele of one gene suppresses the activity of an allele of another gene, is known as
(1995)

Options:

A. epistasis

B. dominance

C. suppression

D. inactivation.

Answer: A

Solution:

Solution:
A gene which masks the action of another gene is termed as epistasis. The gene is called epistatic gene and the gene whose effect is masked is termed as hypostatic gene. eg: body colour of mouse.
So, the correct option is ‘epistasis’.

Question182

The most striking example of point mutation is found in a disease called
(1995)

Options:

A. Down's syndrome

B. sickle cell anaemia

C. thalassaemia

D. night blindness.

Answer: B

Solution:

Solution:
Point mutation involves only the replacement of one nucleotide with another. One type of point mutation is missense mutation. These are base changes that alter the codon for an amino acid resulting in its substitution with a different amino acid.
For example, mutation of the codon CTT to ATT would result in thereplacement of the hydrophobic amino acid leucine with isoleucine, another hydrophobic amino acid.
Many other missense mutations have been described which do affect the encoded protein and result in genetic diseases. These include an A to T mutation inthe gene for β -globin, one of the polypeptides of haemoglobin. This mutation changes codon six of the gene from GAG which encodes glutamic acid to GTG which encodes valine. The mutation results in acondition called sickle cell anaemia.

Question183

An abnormal human male phenotype involving an extra X-chromosome (X X Y) is a case of (1995)

Options:

A. Edward's syndrome

B. Klinefelter's syndrome

C. intersex

D. Down's syndrome.

Answer: B

Solution:

Solution:
Klinefelter's syndrome has 47, XXY chromosomes. It is a genetic disorder in which there is at least one extra X chromosome to a standard human male karyotype or an additional Y chromosome to a standard human female, for a total of 47 chromosomes rather than the found in genetically typical humans

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Question184

The genes, which remain confined to differential region of Y-chromosome, are
(1994)

Options:

A. autosomal genes

B. holandric genes

C. completely sex-linked genes

D. mutant genes.

Answer: B

Solution:

Solution:
Despite differences in morphology, the XY chromosomes are homologous and synapse during zygotene. It is because they have two parts, homologous and differential. Homologous regions of the two help in pairing. They carry same genes which may have different alleles. The differential region of Y-chromosome carries only Y-linked or holandric genes, e . g, testis determining factor (TDF). It is perhaps the smallest gene occupying only 14 base pairs.
Other holandric genes are hypertrichosis (excessive hairiness) on pinna, porcupine skin, keratoderma dissipatum (thickened skin of hands and feet) and webbed toes. Holandric genes are directly inherited by a son from his father. Chromosomes which control most of the morpho-physiological characters other than sex, are called autosomes. Sex linked genes are those which are found on the sex chromosomes. Mutant genes are formed by a change in the nucleotide type and sequence of a DNA segment representing a gene or a cistron.

Question185

A child's blood group is ' O '. The parent's blood groups cannot be
(1994)

Options:

A. A and B

B. A and A

C. AB and O

D. B and O

Answer: C

Solution:

Solution:
O blood group of a child cannot be obtained from the parents having blood group O × AB. The parents blood groups may be A × O, A × B, B × O, B ×A, O × A and O × B

Question186

Albinism is a congenital disorder resulting from the lack of which enzyme?
(1994)

Options:

A. Tyrosinase

B. Xanthine oxidase

C. Catalase

D. Fructokinase

Answer: A

Solution:

Solution:
Albinism is a congenital disorder resulting from the lack of tyrosinase. It is an oxidase that is the rate limiting enzyme for controlling the production of melanin.

Question187

The colour blindness is more likely to occur in males than in females because
(1994)

Options:

A. the Y-chromosome of males have the genes for distinguishing colours

B. genes for characters are located on the sexchromosomes

C. the trait is dominant in males and recessive in females

D. none of the above.

Answer: B

Solution:

Solution:
Colour blindness is more common in men than in women because the genes responsible for the color blindness are located on the X chromosome. Males have only one X chromosome whereas females have two X chromosomes. In males, only one defective X chromosome is enough to cause colour blindness. In females, two defective X chromosomes are required to cause colour blindness. This type of inheritance pattern is called X-linked inheritance and it primarily affects

males.

Question188

Of both normal parents, the chance of a male child becoming colour blind are
(1993)

Options:

A. no

B. possible only when all the four grand parents had normal vision

C. possible only when father's mother was colour blind

D. possible only when mother's father was colour blind.

Answer: D

Solution:

Solution:
The chance of a male child becoming colour blind are possible only when mother's father was colour blind. It is an example of criss cross inheritance. If a cross is made between two sexes differing in certain characters, in such a way that character of one sex remains hidden in the opposite sex of F , generation, but it is passed on to the same sex in the F_2 generation, it is said to exhibit criss cross inheritance.

Question189

Mr. Kapoor has Bb autosomal gene pair and d allele sex-linked. What shall be proportion of Bd in sperms?
(1993)

Options:

A. Zero

B. 1/2

C. 1/4

D. 1/8

Answer: C

Solution:

Genotype of Mr. Kapoor will be Bbd hence one fourth of the sperms will have Bd.

Question190

Which of the following is suitable for experiment on linkage? (1993)

Options:

A. aaBB × aaBB

B. AABB× aabb

C. AaBb × AaBb

D. AAbb × AaBB

Answer: B

Solution:

Solution:
AABB × aabb is suitable for experiment on linkage. Linkage is the tendency for certain genes tend to be inherited together, because they are on the same chromosome. Thus, parental combinations of characters are found more frequently in offspring than non-parental.

Question191

Of a normal couple, half the sons are haemophiliac while half the daughters are carriers. The gene is located on (1993)

Options:

A. X-chromosome of father

B. Y-chromosome of father

C. one X-chromosome of mother

D. both the X-chromosomes of mother.

Answer: C

Solution:

Solution:
The gene is located on one X-chromosomes of mother. Cross between a haemophilic carrier female X^hX and normal male would yield 50% of the sons being haemophilic and 50% of the daughter are carriers.

Question192

Two dominant nonallelic genes are 50 map units apart. The linkage is (1993)

Options:

A. cis type

B. trans type

C. complete

D. absent/incomplete.

Answer: D

Solution:

Solution:
Two dominant non-allelic genes are 50 map units apart. The linkage is absent\/incomplete. Chromosome mapping is based on the fact that genes are linearly arranged in the chromosome and frequency of crossing over is directly proportional to the distance between two genes. Dominant genes show cis arrangement. At 50 map units cis is changed to trans and vice-versa hence no fixed linkage is present.

Question193

A polygenic inheritance in human beings is (1993)

Options:

A. skin colour

B. phenylketonuria

C. colour blindness

D. sickle cell anaemia.

Answer: A

Solution:

Solution:
A polygenic trait is the one that is governed by more than one gene. Human skin colour is a polygenic trait governed by more than one gene, where dominant allele of each gene express only a part of trait and the full trait is expressed only in the presence of dominant alleles of all multiple genes. It is called as polygenic inheritance. These genes control skin pigmentation only, no other phenotypic trait is affected by these genes. This makes option A correct.

Question194

Mendel studied inheritance of seven pairs of traits in Pea which can have 21 possible combinations. If you are told that in one of these combinations, independent assortment is not observed in later studies, your reaction will be
(1993)

Options:

A. independent assortment principle may be wrong

B. Mendel might not have studied all the combinations

C. it is impossible

D. later studies may be wrong.

Answer: B

Solution:

Solution:
Law of independent assortment states thatwhen two individuals differ from each other in twoor more pairs of factors, the inheritance of one pair is quite independent of the inheritance of other. Law of independent assortment is applicable to only those factors or genes which are located on different chromosomes.

Question195

Sex is determined in human beings
(1993)

Options:

A. by ovum

B. at time of fertilization

C. 40 days after fertilization

D. seventh to eight week when genitals differentiate in foetus.

Answer: B

Solution:

Solution:
Sex is determined in human beings at thetime of fertilisation. Sex of the baby depends upon the sperm which fertilises the ovum.

Question196

A child of O-group has B-group father. The genotype of father will be (1992)

Options:

A. $I^{O}I^{\circ}$

B. $I^{BI^{B}}$

C. $I^{A}I^{B}$

D. $I^{B}I^{\circ}$.

Answer: D

Solution:

Solution:
The genotype of the child would be $I^{O}I^{\circ}$ (recessive). Hence, the genotype of the father can only be $I^{B}I^{\circ}$

Question197

An allele is dominant if it is expressed in (1992)

Options:

A. both homozygous and heterozygous states

B. second generation

C. heterozygous combination

D. homozygous combination.

Answer: A

Solution:

Solution:
Hemizygous condition refers to the presence of single copy on a gene rather than two as are present for mendelian traits. Since the dominance-recessive relationship is applied when a trait is exhibited by two copies of same or different alleles of a gene, both recessive and dominant traits are expressed in a homozygous condition which is characterized by the presence of two copies of same alleles for a gene in an individual (TT or tt). The presence of contrasting alleles of a gene in an individual is referred to as heterozygous condition. For example, a plant with genotype “Tt” is heterozygous for the gene of height. Since expression of a recessive allele is masked by the presence of the dominant allele in heterozygous genotype, the only dominant trait is expressed by them irrespective of the presence of both dominant and recessive alleles.

Question198

In a cross between AABB × aabb, the ratio of F_2 genotypes between AABB, AaBB, Aabb and aabb would be (1992)

Options:

A. 9: 3: 3: 1

B. 2: 1: 1: 2

C. 1: 2: 2: 1

D. 7: 5: 3: 1

Answer: C

Solution:

Solution:
In a cross between AABB × aabb, the ratio of F_2 genotypes between AABB, AaBB, Aabb and aabb would be 1: 2: 2: 1 .

Question199

Segregation of Mendelian factors (no linkage, no crossing over) occurs during (1992)

Options:

A. anaphase I

B. anaphase II

C. diplotene

D. metaphase I.

Answer: A

Solution:

Solution:
Segregation of Mendelian factors (no linkage, no crossing over) occurs during anaphase I.
At anaphase I, actual segregation occurs, but twosimilar alleles occurs in the dyad chromosome whichseparate at anaphase II.

Question200

An organism with two identical alleles is (1992)

Options:

A. dominant

B. hybrid

C. heterozygous

D. homozygous.

Answer: D

Solution:

Solution:
An organism with two identical alleles ishomozygous. Homozygous have identical genes at the same locus on each member of a pair of homologous/chromosomes.

Question201

A colour blind mother and normal father would have (1992)

Options:

A. colour blind sons and normal/carrier daughters

B. colour blind sons and daughters

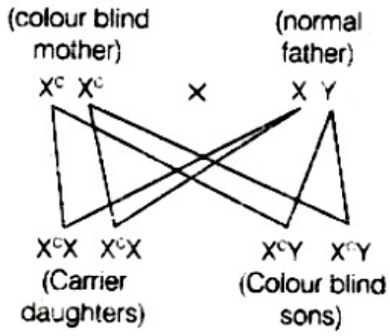
C. all colour blind

D. all normal.

Answer: A

Solution:

Solution:
A colourblind mother and normal father would have colour blind sons and carrier daughters. Daughters will be normal phenotypically but they will be carrier genatypically.
So, the correct answer is 'Colour blind sons and normal/carrier daughters'.



Question202

Down's syndrome is due to
(1992)

Options:

A. crossing over

B. linkage

C. sex-linked inheritance

D. nondisjunction of chromosomes.

Answer: D

Solution:

Solution:
Nondisjunction is the failure of separation of the homologous chromosome during cell division which results in an embryo with three copies of chromosome 21 instead of the usual two. As the embryo develops, the extra chromosome is replicated in every cell of the body and this type of disorder is called as Down's syndrome or trisomy 21. Down's syndrome does not occur due to crossing over, linkage and it is not sex linked. Thus, option A is correct.

Question203

In human beings 45 chromosomes with single X / X O abnormality causes
(1992)

Options:

A. Down's syndrome

B. Kinefelter's syndrome

C. Turner's syndrome

D. Edward's syndrome.

Answer: C

Solution:

Solution:
In human beings, 45 chromosomes with single X / $X O$ abnormality causes Turner's syndrome. Individuals having a single X chromosome $2A + X O$ (45) have female sexual differentiation but ovaries are rudimentary. Other associated phenotypes of this condition are short stature, webbed neck, broad chest, lack of secondary sexual characteristics and sterility. Thus, any unbalance in the copies of the sex chromosomes may disrupt the genetic information necessary for normal sexual development.

Question204

A man of A-blood group marries a women of AB blood group. Which type of progeny would indicate that man is heterozygous A?
(1991)

Options:

A. AB

B. A

C. O

D. B

Answer: D

Solution:

Solution:
$I^{A}I^{0} \times I^{A}I^{B}$ gives us the following genotypes $I^{A}I^{A}$, $I^{O}I^{B}$, $I^{A}I^{B}$. Hence, when a man of blood group A marries a women of AB blood group, B progeny would indicate that man is heterozygous A.

Question205

Multiple alleles control inheritance of
(1991)

Options:

A. phenylketonuria

B. colour blindness

C. sickle cell anaemia

D. blood groups.

Answer: D

Solution:

Solution:
ABO blood group system is due to multiple allelism. A gene can have more than two alleles or allelomorphs, which can be expressed by mutation in wild form in more than one ways. These alleles or allelomorphs make a series of multiple alleles. The mode of inheritance in case of multiple alleles is called multiple allelism. A well known and simplest example of multiple allelism is the inheritance of ABO blood groups in human beings. In human population, 3 different alleles for this character are found - $I^A I^B$ and I°. A person is having only two of these three alleles and blood type can be determined.

Question206

The contrasting pairs of factors in Mendelian crosses are called (1991)

Options:

A. multiple alleles

B. allelomorphs

C. alloloci

D. paramorphs.

Answer: B

Solution:

Solution:
The contrasting pairs of factors in Mendelian crosses are called allelomorphs. Alleles or allelomorphs are the different forms of a gene, having the same locus on homologous chromosomes and aresubject to Mendelian (alternative) inheritance.

Question207

First geneticist/father of genetics was (1991)

Options:

A. De Vries

B. Mendel

C. Darwin

D. Morgan.

Answer: B

Solution:

Solution:
An Austrian Monk, Gregor Mendel, developed his theory of inheritance. He formulated the Law of Heredity. Therefore, he is called the 'father of genetics'.

Question208

Mendel's last law is
(1991)

Options:

A. segregation

B. dominance

C. independent assortment

D. polygenic inheritance.

Answer: C

Solution:

Solution:
Mendel's last law is independent assortment. The principle of independent assortment states that when two individuals differ from each other in two ormore pairs of factors, the inheritance of one pair is quite independent of the inheritance of other.

Question209

Blue eye colour is recessive to brown eye colour. A brown eyed man whose mother was blue eyed marries a blue-eyed women. The children will be
(1991)

Options:

A. both blue eyed and brown eyed 1: 1

B. all brown eyed

C. all blue eyed

D. blue eyed and brown eyed 3 : 1.

Answer: A

Solution:

Solution:
The brown eyed man will have the genotype Bb and his wife bb. Hence ,Bb × bb = Bb : bb Therefore, the children shall be both blue eyed and brown eyed the ratio is 1: 1

Question210

The allele which is unable to express its effect in the presence of another is called
(1991)

Options:

A. codominant

B. supplementary

C. complementary

D. recessive.

Answer: D

Solution:

Solution:
The allele which is unable to express itseffect in the presence of another is called recessive. Amember of a pair of alleles that does not show its effect in the phenotype in the presence of any other allele. It is denoted by small letter.

Question211

RR (Red) Antirrhinum is crossed with white (WW) one. Offspring RW are pink. This is an example of
(1991)

Options:

A. dominant-recessive

B. incomplete dominance

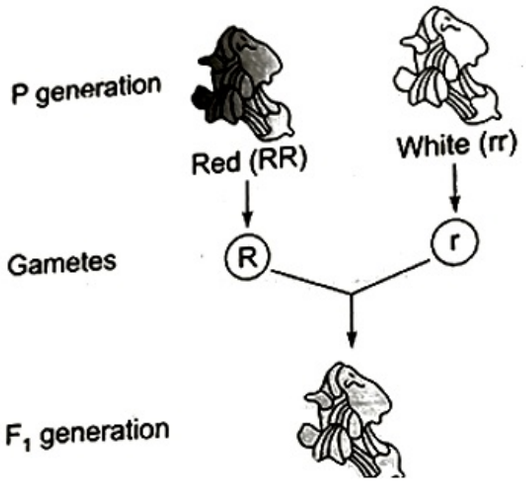
C. hybrid

D. supplementary genes.

Answer: B

Solution:

A red flowered(RR) Snapdragon is crossed with white flowered(rr) Snapdragon. In the F1 generation Snapdragon with pink(Rr) are formed. It is called incomplete dominace.



Question212

A colour blind girl is rare because she will be born only when (1991)

Options:

A. her mother and maternal grand father were colour blind

B. her father and maternal grand father were colour blind

C. her mother is colour blind and father has normal vision

D. parents have normal vision but grand parents were colour blind.

Answer: B

Solution:

Solution:
A colour blind girl is rare because she will be born only when her father and maternal grand-father were colour blind. The genotype of the mother was to be either X^CX^C or X^CX and that of father X^CY so that the daughter becomes colour blind.

Question213

Cross between AaBB and aaBB will form (1990)

Options:

A. 1AaBB : 1aaBB

B. all AaBB

C. 3AaBB; 1aaBB

D. 1AaBB : 3aaBB.

Answer: A

Solution:

Solution:
Cross between AaBB and aaBB will form 1AaBB : 1 aaBB. On crossing, AaBB× aaBB gives 50% individuals having genotype AaBB and 50% individuals having genotype aaBB.

Question214

In a genetic cross having recessive epistasis, F_2 phenotypic ratio would be
(1990)

Options:

A. 9: 6: 1

B. 15: 1

C. 9: 3: 4

D. 12: 3: 1

Answer: C

Solution:

Solution:
In a genetic cross having recessive epistasis, F_2 phenotypic ratio would be $9:3:4$. The recessive epistasis is illustrated by coat colour in mouse, the coat colour is determined by A\/a pair, recessive allele b is epistatic over A / a. Thus, in the presence of bb both A and a give the same phenotype (albino). The F_2 ratio is generally 9: 3: 4

Question215

ABO blood group system is due to
(1990)

Options:

A. multifactor inheritance

B. incomplete dominance

C. multiple allelism

D. epistasis

Answer: C

Solution:

Solution:
ABO blood group system is due to multiple allelism. A gene can have more than two alleles or allelomorphs, which can be expressed by mutation in wild form in more than one ways. These alleles or allelomorphs make a series of multiple alleles. The mode of inheritance in case of multiple alleles is called multiple allelism. A well known and simplest example of multiple allelism is the inheritance of ABO blood groups in human beings. In human population, 3 different alleles for this character are found -1^{A}, B and I $^{\circ}$. A person is having only two of these three alleles and blood type can be determined.

Question216

tt mates with Tt. What will be characteristic of offspring? (1990)

Options:

A. 75% recessive

B. 50% recessive

C. 25% recessive

D. All dominant

Answer: B

Solution:

Solution:
When heterozygous tall(Tt) is crossed with homozygous recessive dwarf(tt), it is said to be test cross. In the 50% progeny are heterozygous tall(Tt) and remaining 50% progeny are homozygous recessive dwarf(tt) are formed.

	t	t
T	Tt Tall	Tt Tall
t	tt Dwarf	tt Dwarf

Tall (Tt) - 50% dominant Dwarf - (tt) - 50% recessive
So, the correct option is ‘50% recessive’.

Question217

In Down's syndrome of a male child, the sex complement is (1990)

Options:

A. XO

B. XY

C. XX

D. XXY.

Answer: B

Solution:

Solution:
In Down's syndrome of a male child, the sex complement is XY. Down syndrome is an autosomal birth defect caused by the presence of an extra chromosome number 21 (three instead of two number 21 chromosomes or trisomy 21).

Question218

Haemophilia is more common in males because it is a (1990)

Options:

A. recessive character carried by Y-chromosome

B. dominant character carried by Y-chromo-some

C. dominant trait carried by X-chromosome

D. recessive trait carried by X-chromosome.

Answer: D

Solution:

Solution:
Haemophilia is more common in males because it is a recessive trait carried by X -chromosome. Haemophilia A is the most common X-linked genetic disease that prevents normal blood clotting when blood vessels are ruptured.

Question219

Which one is a hereditary disease? (1990)

Options:

A. Cataract

B. Leprosy

C. Blindness

D. Phenylketonuria

Answer: D

Solution:

Solution:
Phenylketonuria is a hereditary disease. Phenylketonuria is an inherited error of metabolismcaused by a deficiency in the enzyme phenylalaninehydroxylase. It results in mental retardation and is inherited as an autosomal recessive trait. It is ahereditary human condition resulting from the inabilityto convert phenylalanine into tyrosine. This changecan be traced to a tiny mutation in a single gene onchromosome 12 .

Question220

Both husband and wife have normal vision though their fathers were colour blind. The probability of their daughter becoming colour blind is (1990)

Options:

A. 0%

B. 25%

C. 50%

D. 75%

Answer: A

Solution:

Solution:
Both husband and wife have normal visionthrough their fathers were colour blind, the probabilityof their daughter becoming colour blind is 0%. Thechances of daughter becoming colour blind arises onlywhen the father is also colour blind.

Question221

Bateson used the terms coupling and repulsion for linkage and crossing over. Name the correct parental of coupling type alongwith its cross over or repulsion.
(1990)

Options:

A. Coupling AABB, aabb; Repulsion AABB, aabb

B. Coupling AAbb, aaBB; Repulsion AaBb, aabb

C. Coupling aaBB, aabb; Repulsion AABB, aabb

D. coupling AABB, aabb : Repulsion AAbb, aaBB

Answer: D

Solution:

Solution:
Bateson and Punnet explained that whentwo dominants enter from the same parent-they try to remain together, called coupling. When two dominantsenter from different parents they try to remain seperatecalled repulsion. Bateson and Punnett (1906) used theterm coupling and repulsion in sweet pea (Lathyrus odoratus) for linkage and crossing over. The correctparental of coupling type along with its cross over or repulsion is coupling AABB, aabb : Repulsion AAbb;aaBB.

Question222

A normal green male maize is crossed with albino female. The progeny is albino because
(1989)

Options:

A. trait for a albinism is dominant

B. the albinos have biochemical to destroy plastids derived from green male

C. plastids are inherited from female parent

D. green plastids of male must have mutated.

Answer: C

Solution:

Solution:
A normal green male maize is crossed with albino female. The progeny is albino because, plastids are inherited from female parents.

Question223

Two linked genes a and b show 20% recombination. the individuals of a dihybrid cross between ++/ + + × ab / ab shall show gametes
(1989)

Options:

A. ++ : 80: : ab : 20

B. ++ : 50:: ab : 50

C. ++ : 40:: ab :40: : +a : 10: : +b : 10

D. ++ : 30:: ab :30: : +a : 20: : +b : 20.

Answer: C

Solution:

Solution:
Two linked genes a and b show 20% recombination. The individuals of a dihybrid cross between ++ / + + × ab/ab shall show gametes ++ : 40: : ab : 40: : +a : 10: : +b : 10

Question224

Which contribute to the success of Mendel?
(1988)

Options:

A. Qualitative analysis of data

B. Observation of distinct inherited traits

C. His knowledge of biology

D. Consideration of one character at one time

Answer: D

Solution:

Solution:
Consideration of one character at one timecontribute to the success of Mendel. Mendel'scontribution was unique because of his methodological approach to a definite problem, use of clear cut variables and application of mathematics (statistics) to the problem. Using pea plants and statistical methods, Mendel was able to demonstrate that traits were passed from each parent inheritance of genes.

Question225

A family of five daughter only is expecting sixth issue. The chance of its beings a son is
(1988)

Options:

A. zero

B. 25%

C. 50%

D. 100%

Answer: C

Solution:

A family of five daughter only is expecting sixth issue. The chance of its beings a son is 50%. Human have 22 pairs chromosomes which are $\mathrm{X}\,\mathrm{X}$ in females and XY in males. So if we cross the parents there is 1: 1 chance for boy and girl.

Question226

Haploids are able to express both recessive and dominant alleles/mutations because there are (1988)

Options:

A. many alleles for each gene

B. two alleles for each gene

C. only one allele for each gene in the individual

D. only one allele in a gene.

Answer: C

Solution:

Haploids are able to express both recessive and dominant alleles/ mutations because there are onlyone allele for each gene in the individual. Diploid is an organism containing two different alleles or individual containing both dominant and recessive genes of an allelic pairs.
