**TOPIC: PRINCIPLES OF INHERITANCE AND VARIATION**

**UNIT NO: B-13**

1. Mendel obtained recessive character in F2 by \_\_\_ A \_\_\_ the \_\_\_ B \_\_\_ plants. Here A and B refers to

1. A−self-pollinating; B−F1 2. A−self-pollinating; B−F2

3. A−cross-pollinating; B−F1 4. A−cross-pollinating; B−F2

1. Mendel crossed tall and dwarf plant. In F2 -generation both the tall and dwarf plants were produced. This shows

1. Blending of characters 2. Atavism

3. Non-blending of characters 4. Intermediate characters

1. Mendel’s principle of segregation means that the germ cells always receive

1. One pair to alleles 2. One quarter of the genes

3. Either one allele of father or one allele of mother 4. Any pair of alleles

1. The genotypic ratio of a monohybrid cross in F2−generation is

1. 3 : 1 2. 1 : 2 : 1 3. 2 : 1 : 1 4. 9 : 3 : 3 : 1

1. Which of the following statement is/are correct regarding law of segregation?

1. Alleles separate from each other during gametogenesis

2. The segregation of factors is due to the segregation of chromosomes during meiosis

3. Law of segregation is called as law of purity of gametes 4. All of the above

1. The crossing of F1 to any one of the parents is called

1. Back cross 2. Test cross 3. F1 cross 4. All of these

1. When alleles of two contrasting characters are present together, one of the characters expresses itself during the cross while the other remains hidden. This is the

1. Law of purity of gametes 2. Law of segregation

3. Law of dominance 4. Law of independent assortment

1. Emasculation is the removal of

1. Flower buds 2. Anthers before dehiscence

3. Carpels before dehiscence 4. Mature flowers

1. Mendel’s experiments were based on hybridisation between two plants differing in

1. A pair of contrasting characters 2. Three pairs of contrasting character

3. Many pairs of contrasting character 4. A pair of characters

1. Test cross is

1. Dominant F1-plant crossed with recessive parent plant

2. Recessive F2-plant crossed with dominant F3 plant

3. Dominant F2-plant crossed with recessive parent plant 4. 1 or 2

1. A cross in which parents differ in a single pair of contrasting character is called

1. Monohybrid cross 2. Dihybrid cross 3. Trihybrid cross 4. Tetrahybrid cross

1. By seeing the ratio of F1 and F2-generation Mendel proposed that something was stably passed down unchanged over successive generation and called this something as

1. Alleles 2. Genes 3. Chromosome 4. Factors

1. Graphical representation to calculate the probability of all possible genotype of an offspring in genetic cross is called

1. Bunett square 2. Morgan square 3. Punnett square 4. Mendel square

1. Mendel performed test cross to know the

1. Genotype of F1 2. Genotype of F2 3. Genotype of F3 4. both 1 and 2

1. The genes for seven characters of pea plant that were considered in Mendel hybridisation experiment are present on

1. 4 chromosomes 2. 5 chromosomes 3. 7 chromosomes 4. 8 chromosomes

1. The allele which expresses itself in both homozygous and heterozygous condition is called

1. Dominant allele 2. Recessive allele

3. Incomplete dominant allele 4. Codominant allele

1. 3 : 1 ratio in F2-generation is explained by

1. Law of partial dominance 2. Law of dominance

3. Law of independent assortment 4. Law of segregation

1. Law based on fact that the characters don’t show any blending and both the characters are recovered as such in F2−generation although one character was absent in F1−progeny, is

1. Law of purity of gametes 2. Law of independent assortment

3. Law of incomplete dominance 4. Law of dominance

1. Example of intragenic gene interaction is/are

1. Incomplete dominance 2. Codominance 3. Multiple alleles 4. All of the above

1. Monohybrid test cross ratio is

1. 3 : 1 2. 2 : 1 3. 1 : 1 4. 9 : 3 : 3 : 1

1. When F1- generation progeny resembles both the parents, this is called

1. Codominance 2. Incomplete dominance

3. Both 1 or 2 4. Complete dominance

1. Blood grouping is an example for

1. Multiple alleles 2. Codominance 3. Both 1 and 2 4. Independent assortment

1. The plasma membrane of the red blood cells has \_\_\_ A \_\_\_ polymers that protrude from its surface and the kind of sugar is controlled by the gene. The gene I has three alleles \_\_\_ B \_\_\_. The alleles 1A and IB produce a slightly different form of the sugars, while allele i doesn’t produce any \_\_\_ C \_\_\_

Choose the correct option for A, B and C.

1. A−protein, B−IAIBIO, C−protein 2. A−protein, B−IAIBIO, C−sugar

3. A−sugar, B−IAIBIO, C−protein 4. A−sugar, B−IAIBIO, C−sugar

1. When there are more than two alleles controlling the same character the inheritance is called These are called

1. Polygenic inheritance 2. Multiple factor inheritance

3. Multiple allelic inheritance 4. All of these

1. Starch synthesis gene in pea plant is the example of

1. Single gene producing more than one effect 2. Multiple genes producing one effect

3. Multiple genes producing multiple effects 4. Codominance

1. Starch synthesis gene in pea plant in heterozygous condition produces starch grain of intermediate size. This shows

1. Complete dominance 2. Incomplete dominance 3. Codominance 4. Dominance

1. The title of Mendel’s paper, which was presented at Natural History Society, Brunn, in 1865 was

1. Laws of inheritance 2. Laws of heredity

3. Experiments on pea plants 4. Experiments on plant hybridization

1. Ratio of progeny, when a red coloured heterozygous crossed with a white coloured plant in which red colour is dominant to white colour.

1. 3 : 1 2. 1 : 1 3. 1 : 2 : 1 4. 9 : 3 : 3 :1

1. Dominant allele are expressed in

1. Second generation 2. Homozygous condition 3. Heterozygous condition 4. Both 2 and 3

1. Match the following columns.

|  |  |  |  |
| --- | --- | --- | --- |
| Column I | | Column II | |
| a. | Testcross | 1 | 9 : 3 : 3 : 1 |
| b. | Monohybrid cross | 2 | Tt × tt |
| c. | Back cross | 3 | Tt × TT |
| d. | Dihybrid cross | 4 | 3 : 1 |

Codes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | a | b | c | d |
| 1 | 2 | 4 | 3 | 1 |
| 2 | 2 | 4 | 1 | 4 |
| 3 | 3 | 4 | 1 | 2 |
| 4 | 1 | 4 | 1 | 3 |

1. How many phenotype and genotypes are possible in ABO blood group systems?

1. Four, five 2. Four, six 3. Four, seven 4. Three, four

1. Mendel’s work later formulated into laws of

I. Linkage II. Segregation

III. Incomplete dominance IV. Independent assortment

Choose the correct option.

1. I, III and IV 2. II and IV 3. II, III and IV 4. I, II and III

1. Which contributed to Mendel’s success?

I. Selection of pea plant II. Knowledge of history

III. One character at one time IV. His statistical knowledge

Choose the correct option

1. I, II, III and IV 2. II and III 3. I, III and IV 4. IV, III and II

1. The types of gametes formed by the genotype RrYy are

1. RY, Ry, rY, ry 2. RY, Ry, ry, ry 3. Ry, Ry, Yy, ry 4. Rr, RR, Yy, YY

1. Mendelism was rediscovered by

I. Morgan II. de Vries III. Correns IV. Tschermak

Choose the correct option.

1. I, III and IV 2. I, II, III and IV 3. II, III and IV 4. I, II and III

1. How many different kinds of gametes will be produced by a plant having genotype AABbcc?

1. Three 2. Four 3. Nine 4. Two

1. The law of segregation of characters is also called the law of purity of gametes because

1. Gametes have only one of the two alleles for each characters

2. Gametes cannot be contaminated 3. Gametes are very different type of cells

4. Both tall and dwarf plants in 1 : 2

1. In Mirabilis, a hybrid for red (RR) and white (rr) flower produces pink (Rr) flower. A plant with pink flower is crossed with white flower, the expected phenotypic ratio is

1. Red : Pink : White (1 : 2 : 1) 2. Pink : White (1 : 1)

3. Red : Pink (1 : 1) 4. Red : White (3 : 1)

1. If two pea plant having red (dominant) coloured flowers with unknown genotype are crossed, 75% of the flowers are red and 25% are white. The genotypic constitution of the parents having red coloured flowers will be

1. Both homozygous 2. One homozygous and other heterozygous

3. Both heterozygous 4. Both hemizygous

1. Which cross was used to study the independent assortment?

1. Monohybrid cross 2. Dihybrid cross 3. Trihybrid cross 4. Tetrahybrid cross

1. Types of genotype observed in a dihybrid cross are

1. 9 2. 12 3. 4 4. 6

1. In cross between yellow round (YYRR) and pure breeding pea plants having green wrinkled (yyrr) find out the total seeds (plants) having yellow colour in F2-generation

1. 12 2. 10 3. 14 4. 11

1. In cross between yellow round (YYRR) and green wrinkled (yyrr) find out the ratio between seeds having yellow and green seed colour.

1. 3 : 2 2. 3 : 1 3. 9 : 7 4. 7 : 9

1. What is genotypic ratio in a dihybrid cross?

1. 1 : 2 : 1 : 2 : 4 : 2 : 1 : 2 : 1 2. 2 : 4 : 2 : 1 : 2 : 1 : 1 : 2 : 1

3. 1 : 4 : 2 : 1 : 1 : 1 : 2 : 1 4. 4 : 2 : 1 : 1 : 1 : 1 : 2 : 1 : 1

1. Total number of round seed in a cross between pure yellow round and pure green wrinkled seeds in F2 is (out of total 16 resulted)

1. 9 2. 12 3. 11 4. 10

1. Total number of wrinkled seed in previous question

1. 4 2. 3 3. 2 4. 1

1. Dihybrid ratio of test cross 1 : 1 : 1 : 1 proves that

1. F1-hybrid produces four different progenies 2. F1-hybrid produces two different progenies

3. Parents produces two different progenies 4. None of the above

1. The important things to remember are that chromosomes as well as genes occur in \_ A \_. the two alleles of a gene pair are located on homologous sites on \_\_\_ B \_\_\_ chromosomes.

Choose the correct choice for A and B

1. A−single, B−analogous 2. A−pair, B−analogous 3. A−pair, B−homologous 4. A−single, B−heterozygous

1. Who argued that pairing the separation chromosomes would lead to the segregation of a pair of factor they carried?

1. Sutton 2. Boveri 3. Both 1 and 2 4. Morgan

1. Who proposed the chromosomal theory of inheritance?

1. Sutton and Mendel 2. Boveri and Morgan 3. Morgan and Mendel 4. Sutton and Boveri

1. Experimental evidences of chromosomal theory of inheritance was given by

1. Sutton 2. TH Morgan 3. Boveri 4. Both 1 and 3

1. The person famous for experimental genetics

1. TH Morgan 2. Sutton 3.Boveri 4. Robert Hooke

1. Fruit fly is excellent model for genetics because of

I. Small life cycle (two week). II. Can be feed on simple synthetic medium.

III. Single mating produce large number of progeny IV. Clear differentiation of sexes.

V. Many heredity variation can be seen with low power microscopes.

Choose the correct option.

1. I, II and II 2. III, IV and V 3. I, IV and V 4. All of these

1. Who clearly proved and define linkage?

1. Morgan 2. Castle 3. Bateson 4. Punnett

1. Linked gene are present on

1. Same chromosome 2. Different chromosome 3. Heterologous chromosome 4. Paired chromosome

1. \_ A \_ genes are those which occurs on the same chromosome and\_ B \_ genes are those, which are present on different chromosome.

Choose correct choice for A and B.

1. A−linked; B−unlinked gene 2. A−unlinked; B−linked

3. A−identical; B−non-identical 4. A−non-identical; B−identical

1. Frequency of crossing over is \_ A \_ in linked gene \_ B \_ in unlinked gene.

Choose correct combination for A and B.

1. A−more; B−less 2. A−less; B−more 3. A−same; B−same 4. A−same; B−happened

1. First time who used the term frequency of recombination?

1. Alfred Sturtevant 2. Alfred Nobel 3. Pasteur 4. Mendel

1. Linkage gene do not shows

1. Independent assortment 2. 9 : 3 : 3 : 1 3. Segregation 4. All of the above

1. Colour blindness is

1. Sex-linked recessive disease 2. Sex-linked dominant disease

3. Autosomal dominant disease 4. Autosomal recessive disease

1. The genes located in the same chromosome do not separate and are inherited together over its generations due to the phenomenon of

1. Complete linkage 2. Incomplete linkage 3. Incomplete recombination 4. Complete recombination

1. When the number of recombinant progeny is usually less than the number expected in independent assortment it is called

1. Complete linkage 2. Incomplete linkage

3. Complete recombination 4. Complete independent assortment

1. The specific pair of chromosomes which determine the sex of the individual called

1. Sex chromosomes 2. Allosomes 3. Heterosomes 4. All of these

1. In XX and XY type of sex determination, ♂s are

1. Homogametic 2. Heterogametic 3. Both 1 and 2 4. Isogametic

1. Sex linked traits are the traits determined by

1. Sex chromosome 2. Autosomes 3. Allosomes 4. Both 1 and 3

1. Sex limited traits are the

1. Traits appeared in particular sex 2. Traits which governed by genes present in both sexes

3. Traits which influenced by the sex hormones 4. All of the above

1. Milk secretion and baldness, both the traits belongs to

1. Sex limited 2. Sex linked 3. Sex influenced 4. Autosomal traits

1. The traits which are not expressed due to a particular gene but are expressed by products of sex hormones are

1. Sex influenced traits 2. Autosomal traits 3. Allosomic traits 4. Sex linked traits

1. Low pitched voice, beard and moustaches. belong to the

1. Sex limited traits 2. Sex linked trait 3. Nullisomic traits 4. Sex influenced traits

1. In XX and XO chromosomal sex determination there is absence of one chromosome in

1. Male 2. Female 3. Both 1 and 2 4. None of these

1. Female is heterozygous and male is homozygous in

1. Fishes and bird 2. Reptiles 3. Butterflies and moth 4. All of these

1. Haploid-diploid mechanism of sex determination (haplodiploidy) takes place in

1. Bees 2. Wasps 3. Ants 4. All of these

1. In haplodiploidy determination of sex, males is

1. Haploid 2. Diploid 3. Triploid 4. Tetraploid

1. The recessive genes located on X-chromosome in humans are always

1. Lethal 2. Sub-lethal 3. Expressed in males 4. Expressed in females

1. A. X/A =1; B. X/A = more than 1; C. X/A = 0.5. Here, X = number of X-chromosome; A = set of autosomal pair. Choose the correct option for A, B and C result.

1. A−female B−meta female C−male 2. A−female B−meta female C−female

3. A−female B−female C−male 4. A−meta female B−female C−male

1. Hypertrichosis is an example of which inheritance

1. Holandric 2. Incomplete sex-linked 3. Sex-influenced 4. Sex-limited

1. Which one of the following conditions correctly describes the manner of determining the sex in the given example?

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

2. XO condition in humans as found in Turners syndrome, determines female sex

3. Homozygous sex chromosomes (XX) produce male in Drosophila

4. Homozygous sex chromosomes (ZZ) determine female sex in birds

1. Calvin bridges demonstrated sex determining factor is the ratio of number of

1. X-chromosome to autosome 2. Autosome to X-chromosome

3. Y-chromosome to X-chromosome 4. Y-chromosome to autosome

1. Genic balance theory of sex determination, stated by CB Bridges, is related to

1. Drosophila melanogaster 2. Apis 3. Snapdragon 4. Snails

1. Barr body in mammals represent

1. All the heterochromatin in female cells 2. One of the two X-chromosomes in somatic cells females

3. All the heterochromatin in male and female cells 4. The Y−chromosome in somatic cells of male

1. Number of Barr body in XXXY is

1. 1 2. 2 3. 3 4. 4

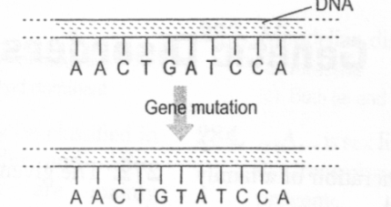
1. Point mutation arises due to change in

1. Single base DNA 2. Single base pair of DNA

3. Segment of DNA 4. Double base pair of DNA

1. Classical example of point mutation is

1. Sickle-cell anaemia 2. Thalassaemia 3. Cancer 4. All of the above

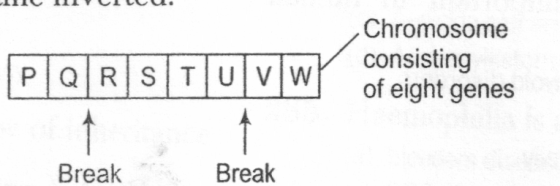
1. Identify the type of mutation in given diagram.

1. Inversion

2. Insertion

3. Deletion

4. Substitution

1. The chromosome shown in the diagram below is broken at the points which are indicated by the arrows and the genes between these points became inverted.

The resulting order of the genes will be

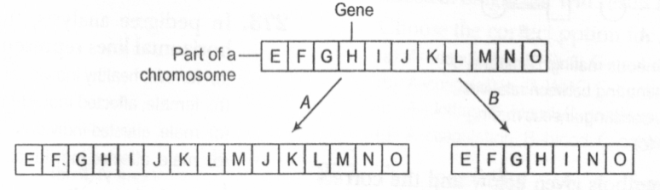
1. PQUTSRVW 2. WVUTSRQP

3. PQTURSVW 4. VWLJTSRPQ

1. Mendelian disorder may be of

1. Recessive 2. Dominant 3. Both 1 or 2 4. Can’t be determined

1. The following diagram shows two types of chromosomal mutations.

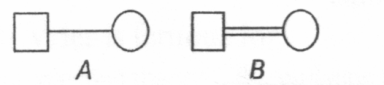
Give the name or type of mutation in respect to A and B.

1. A−Duplication, B−Substitution

2. A−Duplication, B−Deletion

3. A−Inversion, B−Deletion

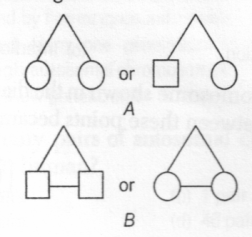
4. A−Inversion, B−Substitution

1. Identify the correct choice for given symbols (A and B).

1. A−consanguineous mating; B−mating

2. A−mating; B−mating between relatives

3. A−mating; B−consanguineous mating 4. Both 2 and 3

1. The given diagram A and B indicates.

1. A−Zygotic twins; B−Dizygotic twins

2. A−Dizygotic twins; B−Identical twins

3. A−Zygotic twins; B−Identical twins

4. A−Identical twins; B−Dizygotic twins

1. Match the following columns.

|  |  |  |  |
| --- | --- | --- | --- |
| Column I | | Column II | |
| a. |  | 1. | Death |
| b. |  | 2. | Five unaffected offspring |
| c. |  | 3. | Sex unspecified |
| d. |  | 4. | Female |
| e. |  | 5. | Male |

Codes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | a | b | c | d | e |
| 1 | 1 | 2 | 5 | 4 | 3 |
| 2 | 1 | 2 | 4 | 3 | 5 |
| 3 | 1 | 2 | 3 | 4 | 5 |
| 4 | 5 | 4 | 3 | 2 | 1 |

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**UNIT NO: B-13**

**ANSWER KEY**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Ans.** | **Q. No.** | **Ans.** | **Q. No.** | **Ans.** | **Q. No.** | **Ans.** | **Q. No.** | **Ans.** |
| 1 | **1** | 2 | **3** | 3 | **3** | 4 | **2** | 5 | **4** |
| 6 | **2** | 7 | **3** | 8 | **2** | 9 | **1** | 10 | **1** |
| 11 | **1** | 12 | **4** | 13 | **3** | 14 | **1** | 15 | **1** |
| 16 | **1** | 17 | **4** | 18 | **2** | 19 | **1** | 20 | **3** |
| 21 | **1** | 22 | **3** | 23 | **4** | 24 | **1** | 25 | **1** |
| 26 | **2** | 27 | **4** | 28 | **3** | 29 | **4** | 30 | **1** |
| 31 | **2** | 32 | **2** | 33 | **3** | 34 | **1** | 35 | **3** |
| 36 | **4** | 37 | **1** | 38 | **1** | 39 | **2** | 40 | **2** |
| 41 | **1** | 42 | **1** | 43 | **2** | 44 | **1** | 45 | **2** |
| 46 | **1** | 47 | **1** | 48 | **3** | 49 | **3** | 50 | **4** |
| 51 | **2** | 52 | **1** | 53 | **4** | 54 | **1** | 55 | **1** |
| 56 | **1** | 57 | **2** | 58 | **1** | 59 | **4** | 60 | **1** |
| 61 | **3** | 62 | **1** | 63 | **4** | 64 | **2** | 65 | **4** |
| 66 | **4** | 67 | **1** | 68 | **2** | 69 | **4** | 70 | **1** |
| 71 | **4** | 72 | **4** | 73 | **1** | 74 | **3** | 75 | **1** |
| 76 | **1** | 77 | **1** | 78 | **1** | 79 | **1** | 80 | **2** |
| 81 | **2** | 82 | **2** | 83 | **1** | 84 | **2** | 85 | **1** |
| 86 | **3** | 87 | **2** | 88 | **4** | 89 | **2** | 90 | **4** |