Biology
Classified MCQ
Unit 6
2000 - 2020

Scientific basis of Mendel's experiments

(1) In pea plants red flower (R) is dominant to white flower (r) and green deed (G) is iominant to yellow seed (g). In order to determine the genotype of a plant which had red flowres and green seeds it was crossed with a plant which had white flowers and yellow seeds. The progeny obtined was of two types, red flowers with green seeds and white flowers with green seeds. The genotypes of the tested plant is likely to be
(1) RRGG (2) RrGG (3) RrGg (4) RrGg (5) rrgg (2000)

• Question 2 and 3 are based on the date given below.
Tall tomato plants having red fruits were crossed with short tomato plants having orange fruits. All plants in F_1 generation were tall with red fruits. When F_1 plants were crossed with each other the following phenotype ratio was obtained in the F_2 generation.

Tall plants having red fruits : Short plants having orange furits
3 : 1

(2) Which one of the following statements is correct regarding the above observations?
(1) The tall parent plants with red fruits are heterozygous.
(2) Both types of parents are heterozygous.
(3) Independent assortment is shown by both characters.
(4) In F_2 generation, 50% are heterozygous.
(5) The F_1 plants are heterozygous for one character. (2003)

(3) If the above F_1 plants are crossed with short plants having orange fruits, the % of short plants having orange fruits in the resultant progeny would be
(1) 100% (2) 66% (3) 50% (4) 33% (5) 25% (2003)

(4) Select the incarrect statement regarding inheritance.
(1) Principle of dominance in heredity was first discovered by Gregor Mendel.
(2) Interestince of characters do not always follow Mendelian laws.
(3) Mendelin dihybird crosses always produce 4 phenotypes in 9:3:3:1 ratio in the F_2 generation.
(4) Dilybird test crossed always produce four types of progeny in 1:1:1:1 ratio.
(5) All test crosses are not back crosses. (2005)

(5) When two white flowered plants were crossed, the F_1 plant produced red flowers. When this F_1 plant was self pollinated, 179 of F_2 plants produced red flowers and 141 of F_2 plants had white flowers. The flower colour in these plants would have been inherited by
(1) polygenic inheritance.
(2) two genes complementing each other.
(3) two alleles showing incomplete dominance.
(4) two genes which are acting antagonistically.
(5) two linked genes. (2007)

(6) In cats, presence of white patches is a dominant character while single colour is recessive. Short hair is dominant and long hair is recessive. When a cat with white patches and short hair is crossed with a cat with single colour and long hair, four kittens were born; one with white pateches and short hair, one with white patches and long hair, one with single colour and short hair and one with single colour and long hair. Which of the following is incorrect regarding the above cross?
(1) This is a test cross.
(2) This involves two independently segregating genes.
(3) The kitten with white patches and short hair in the progeny, is homozygous with regard to both genes.
(4) One of the parents is heterozygous with regard to both the genes.
(5) The kitten with white patches and long hair in the progeny, is heterozygous for white patches. (2008)

(7) In a plant species, fruits can be either red or yellow. Both these types can be obtained as pure lines. When two plants with yellow fruits were crossed, all F_1 plants produced red fruits. When F_1 plants were inbred, F_2 progeny had 27 plants with red fruits and 21 plants with yellow fruits. Which of the following statements is incorrect with regard to this inheritance?
(1) Colour of fruits could be produced by the interaction of two genes.
(2) This is an example of epistasis.
(3) Dominant alleles of two genes may be necessary to produce red colour.
(4) All plants with red fruits in F_2 progeny may be pure lines.
(5) All plants with yellow fruits in F_2 progeny may not be pure lines. (2009)

(8) Which of the following statements regarding heredity is incorrect?
(1) The fact that hereditary factors exist in pairs and they segregate in the formation of gametes was discovered by Mendel.
(2) Boveri and Sutton proposed that hereditary factors are carried in chromosomes.
(3) Johannsen gave the name genes to hereditary factors.
(4) Morgan discovered that chromosomes pair in meiosis before gemetes are formed.
(5) Hertwig discovered that gametes fuse at fertilization. (2010)

(9) In a plant species, red flowers (R) is a dominant character while white flowers (r) is a recessive character. Elongated fruits (L) is a dominant character while round fruits (l) is a recessive character. Assume that the two genes R and L are presint in the same chromosome with 18 map units apart. When a true breeding plant with red flowres and elongated fruits was crossed with a true breeding plant with white flowers and round fruits, and the F_1 plants were self pollinated to produce F_2 plants. What pecentage of plants in the F_2 progeny will have white flowers and round fruits?
(1) 82 % (2) 41% (3) 18 % (4) 9 % (5) 0 % (2010)

(10) In a variety of pea, flower colour red (R) is dominant over white (r) and seed colour yellow (Y) is dominant over green (y). Assume that genes for flower colour and seed colour are on two different chromosomes. When two plants with red flowers and yellow seeds were crossed, ¾ of the progeny were red flowered with yellow seeds and the remaining ¼ were white flowered with yellow seeds. The genotypes of the parents are likely to be
(1) RRYY and rrYy (2) RrYY and RRYY (3) RrYy and RrYy
(4) RrYy and RrYY (5) Rryy and RrYy (2011)

(11) In a variety of Pea, the tall plant is dominant (T) and the short plant is recessive (t). In the same variety, yellow coloured seed is dominant (Y) and the green coloured seed is recessive (y). A cross between two plants resulted in 296 tall plants with yellow seeds and 104 tall plants with green seeds. Which of the following is most likely to be the genotypes of the parent plants?

1) TTYY x TTYY 2) TTyy x TTYy 3) Tt Yy x TtYy
4) TtYy x TTYy 5) TtYY x Ttyy (2012)

(12) In mice, grey fur colour (G) is dominant to black fur colour (g). Expression of colour is determined by another gene with a pair of alleles where the dominant allele (C) expresses colour and recessive allele (c) indicates albinism. When a grey coloured mouse was bred with a black coloured mouse, the resultant progeny had a phenotypic ratio of 3 grey : 3 black : 2 albino. Which of the following indicates the genetypes of the parents?

1) GGCc x ggCC 2) GGCC x ggCc 3) GGCc x ggCc
4) GgCC x ggCc 5) GgCc x ggCc (2013)

(13) In a pea plant red seeds (R) are dominant to yellow seeds (r) and long pods (L) are dominant to short pods (l). When a plant having red seeds and long pods was crossed with a homozygous recessive plant the following progeny resulted.

Plants with red seeds and long pods - 138
Plants with red seeds and short pods - 145

The genotype of the plant having red seeds and long pods which was crossed with the homozygous recessive plant is

(1) RrLL (2) rrLL (3) RRLL (4) RRLl (5) RrLl (2014)

(14) In the pea plant, tall trait (T) is dominant and dwarf trait (t) is recessive; purple flower colour (P) is dominant and white flower colour (p) is recessive; round seed shape (R) is dominant and wrinkled seed shape (r) is recessive. In an F_2 progeny produced by mating two F_1 plants heterozygous for all three genes what proportion will show the fully recessive phenotype?

(1) $\frac{1}{4}$ (2) $\frac{1}{8}$ (3) $\frac{1}{16}$ (4) $\frac{1}{64}$ (5) $\frac{1}{256}$ (2015)

(15) A cross between pure line short-black haired and pure line long-white haired Guinea pigs produced short-black haired offspring in the F_1 generation. If there were 33 offspring in the F_2 generation of this cross, how many of them would have short-black hair according to Mendel's laws?

(1) 19 (2) 12 (3) 9 (4) 6 (5) 2 (2016-30)

(16) A genotype consisting of only one type of alleles for a character is

(1) hormozygous for that character (2) homogenous for that character
(3) heterozygous for that character (4) heterogenous for that character
(5) monoallelic for that character (2017-32)

(17) Which of the following statements regarding the cross Rr x Rr is correct?
(1) The probability of having the allele r in both the egg and sperm at fertilization is 1/2.
(2) This is a dihybrid cross because two alleles are involved.
(3) According to Mendelian inheritance, the probability of having dominant phenotype in F_2 generation by interbreeding of F_1 is $\frac{9}{16}$.
(4) If 1 : 2 : 1 ratio of phenotypes was obtained in F_2 generation by interbreeding of F_1 generation it may be due to codominance.
(5) R and r are linked. (2019-31)

(18) Which of the following statements regarding the results of Mendel's experiments is/are correct?
(A) F_2 generation of a monohybrid cross shows 3 : 1 phenotypic ratio.
(B) Heritable factors of a dihybrid cross are located close to each other on the same chromosome.
(C) Each heritable character is determined by two heritable factors.
(D) Heritable factors of a dihybrid cross are located on two non-homologous chromosomes.
(E) F_2 generation of a dihybrid cross shows 9 : 3 : 3 : 1 genotypic ratio. (2020-47)

Inheritance of Mendelian traits in man.

(1) Occurrence of dimplesin humans is a double recessive Mendelian character. If 2.25% of a certain population echibits this character, the percentage of that population which is heterogenous for this character is,
(1) 97.75 (2) 85 (3) 74.5 (4) 72.25 (5) 25.5 (2002)

(2) Which one of the following statements regarding the inheritance of haemophilia in humans is correct?
(1) If a carrier woman marries a haemophilic man, 50% of their children would be normal.
(2) If a carrier woman marries a normal man, 50% of their children would be haemophilic.
(3) If a normal woman marries a haemophilic man, 50% of their sons would be normal.
(4) If a carrier woman marries a normal man, 50% of their children would be normal.
(5) If a carrier woman marries a haemophilic man, all of their sons would be haemophilic. (2016-31)

Genetic patterns that deviate from mendel's laws.

(1) Which of the following phenomena is not likely to cause an increase in phenotypic vacition among the progeny of a genetic cross?
(1) Independent segregation. (2) linkage. (3) crossign over.
(4) incomplete dominance. (5) mutation. (2000)

(2) Which of the following statments is incorrect?

(1) In the nucleus of a somatic cell of a diploid organism there are two identical sets of chromosomes.

(2) All chromosomes in the nucleus duplicate before meiosis.

(3) Only some parts of human X and Y chromosomes are homologous.

(4) Certain disorders in humans are caused by the presence of more than 44 autosomes.

(5) Exchange of parts of chromosomes can take place during meiosis. (2001)

(3) A Child of blood group O was born to a mother with blood group B and a father with blood group A. Parental genotypes could be.

	Father	Mother
(1)	I^AI^A	I^BI^B
(2)	I^AI^B	I^AI^B
(3)	I^AI^B	I^BI
(4)	I^AI	I^BI
(5)	I^AI	I^AI^B

(2002)

(4) A cross between two plants bearing pink flowers, rsulted in plants with red flowers, pink flowers and white flowers in the ratio 1 : 2 : 1. The result could be due to

(1) Epistasis (2) incomplete dominance (3) mutation

(4) multiple allele inheritance (5) poly gene inheritance (2002)

(5) Sex – linked hereditary disorders of man is/are

(A) Down's syndrome (B) Turner's syndrome

(C) Red – green colour blindness (D) Haemophilia

(E) Klinefelter's syndrome (2002)

- Question 6 and 7 are based on the following data.

A tall, hairy tomato plant was crossed with a short, hairless tomato plant. All plants in F1 generation were tall and hairy. When a plant of the F1 generation was crossed with a short, hairless plant the following results were obtained.

Tall, hairy	- 18
tall, hairless	- 19
short, hairy	- 17
short, hairless	- 20

(6) Which one of the following statements is incorrect about the above cross?

(1) Tall, hairy are the dominant characters.

(2) Cross between plants of the F_1 generation and short, hairless plants is a test corss.

(3) Plant of the F_1 generation are heterozygous for both characters.

(4) In F_2 generation tall, hairy plants are homozygous.

(5) Both characters show independent assortment. (2004)

(7) Which one of the following gives the correct percentage of short, hairy plants when a short, hairy plant in F_1 generation is corssed with a short, hairless plant?
(1) 25% (2) 50% (3) 75% (4) 0% (5) 100% (2004)

(8) Which of the following is/are correct regarding epistasis?
(A) Each allele will have a certain degree of expression.
(B) Intermediate phenotypes are generated.
(C) There is a distinct detectable expression of two alleles.
(D) One allele suppresses the expression of others.
(E) There is an additive expression of alleles. (2004)

(9) When ash coloured mice were crossed to white mice all the F_1 progeny were ash coloured. When the F_1 progeny males and females were crossed, the F_2 progeny had 18 ash coloured mice, 6 black mice and 8 white mice.
Based on the above results, which of the following conclusions is incorrect?
(1) Black colour of mice is a recessive character.
(2) This is an example of incomplete dominance.
(3) Ash colourd parents used in the first cross were homozygous.
(4) F_1 progeny were heterozygous.
(5) At least two genes are involved in determining coat colour of mice. (2005)

(10) Select the incorrect statement regarding inheritance.
(1) In monohybrid bird crosses involving a pair of characters showing incomplete dominance the F_1 progeny is different from both parents.
(2) Characters showing linkages are produced by genes in the same chromosome.
(3) Human ABO blood groups are caused by alleles showing incomplete dominance.
(4) Inheritance of sexuality of humans do not obey mendelian laws.
(5) Height of humans is a character showing polygenic inheritance. (2005)

(11) Budgie birds exist in 4 colour types, viz, blue, green, yellow and white. All these can be maintained in pure lines and following results were obtained when pure line types were crossed.
When a yellow one was crossed with a white one, all progeny were yellow.
When blue one was crossed with a white one, all progeny were blue.
When green one was crossed with a white one, all progeny were green.
When a yellow one was crossed with a blue one, all progeny were green.

Which of the following hypothesis cannot be made from these results regarding the inheritance of the colour?
(1) More than one gene is involved in the determination of the colour.
(2) This is an example for polyallelism.
(3) White colour is a double recessive character.
(4) Green colour is a double dominant character.
(5) Green colour can be produced by heterozygous genotype. (2006)

12) Following list indicated five different patterns of non Mendelian inheritance with one example for each. Only one of the given examples is correct. Select the pattern of inheritance with the correct example.
(1) Polyallelism – inheritance of plumage colour of chicken.
(2) Incomplere dominance – inheritance of ABO human blood groups.
(3) Sex linked inheritance – inheritance of haemophilia.
(4) Epistasis – inheritance of Down's syndrome.
(5) Aneuploidy – inheritance of flower colour in *Mirabilis* plant. (2008)

(13) White Wyandotte and white leghorn, are two of true breeding types of chicken with tully white feathers, When white leghorns are crossed with white Wyandotte, all F_1 birds are white. When the F_1 birds are inbred, the F_2 progeny had white birds and coloured birds at 13:3 proportion. Which of the following conclusions in incorrect regarding this inheritance?
(1) Inheritance of feather colour involves at least two genes.
(2) This is an example of epistasis.
(3) Two complementary genes are involved in this inheritance.
(4) F_1 birds should have heterozygous genotypes.
(5) Both parental types have homozygous genotypes. (2008)

(14) Assume that A, B, C and D represent dominant alleles of four independently segregating genes of a plant species and a, b, c and d are their respective recessive alleles. If a plant of genotype AaBbCcDd was self pollinated, what will be the ratio between the numbers of phenotypes to genotypes among the progeny plants?
(1) 2 : 3 (2) 3 : 8 (3) 8 : 3 (4) 8 : 27 (5) 16 : 81 (2009)

(15) Red-green colour blindness is a rare sex linked character among people. A woman whose husband is normal, gave birth to a son who is colour blind. What is the probability that their next child will be colour blind?
(1) 1 (2) 0.75 (3) 0.5 (4) 0.25 (5) 0.125 (2009)

(16) Which of the following statements is incorrect regarding inheritance of genes?
(1) Independent segregation of genes cannot take place without meiosis.
(2) Presence of codominant alleles tend to increase the phenotypic classed of a genetic character.
(3) Genetic recombination decreases genetic diversity in populations.
(4) Epistasis can occur due to dominant alleles as well as recessive alleles.
(5) Genes determining polygenic characters usually segregate independently. (2010)

(17) A true breeding white flowered plant is corssed with a true breeding red flowered plant of the same species. The resulting F_1 generation had all pink flowered plants. The F_2 offspring resulting from self crossing of F_1 offspring, produced red flowered plants, white flowered plants and pink flowered plants. Which one of the following interactions between alleles is the likely cause for the above?
(1) Incomplete dominance (2) Polyallelism (3) Linkage
(4) Epistasis (5) Polygenic inheritance (2012)

(18) Which of the following diseases can be inherited?
(A) Cystic fibrosis (B) Sickle cell anaemia (C) Tuberculosis
(D) AIDS (E) Poliomylitis (2012)

(19) Two true breeding plants, one with dark blue flowers and one with white flowers were crossed. The F_1 offspring of this cross produced light blue flowers. When the F_1 progeny was self crossed 1 : 2 : 1 ratio of plants with dark blue, light blue and white flowers was observed. What genetic character is shown by these results?
(1) Epistasis (2) Incomplete dominance (3) Co-dominance
(4) Polyallelism (5) Gene linkage (2016-28)

(20) Which of the following statements is/are correct?
(A) Allele is one of the alternative forms of the same gene.
(B) Locus is the position of an allele in a DNA molecule.
(C) Human ABO blood groups are an example for codominance.
(D) Gene is the basic unit of inheritance of a certain character.
(E) The cross carried out to determine the genotype of an organism is the back-cross. (2016-50)

(21) When a red flowered plant of a certain species is crossed with a white flowered plant of the same species, all progeny were pink flowered. This type of inheritance results in due to
(l) Mendelian-inheritance. (2) polygenic inheritance (3) codominance
(4) incomplete dominancc (5) polyallelism. (2018-28)

(22) In man, sickle cell anaemia is an example for
(1) heterozygous dominance. (2) polygenic inheritance.
(3) epistasis. (4) pleiotropy. (5) epigenetics. (2019-30)

(23) During the gametogenesis of a particular person, a gamete with 24 chromosomes was produced. This gamete was fertilized with a normal gamete and a child was born. Which of the following best explains this process and its result?
(1) Aneuploidy, trisomy, Down syndrome
(2) Polyploidy, trisomy, Klinefelter syndrome
(3) Aneuploidy, monosomy, Down syndrome
(4) Aneuploidy, monosomy, Klinefelter syndrome
(5) Polyploidy, trisomy, Down syndrome (2019-32)

(24) Hybrid vigour is
(1) increased by breeding among genetically similar individuals.
(2) higher in parents than in their F_1 generation.
(3) achieved by increasing heterozygocity.
(4) maintained by breeding among hybrids.
(5) a result of interspecific hybridization. (2020-31)

Changes in gene frequencies

(1) Which statement is incorrect regarding Hardy Weinberg equilibrium in populations?
(1) Occurrence of mutations can disturb the equilibrium.
(2) Emigration of members does not affect the equilibrium.
(3) The equilibrium is maintained onlyin large populations.
(4) It is difficult to find natural populations in which this equilibrium is maintained.
(5) In evolving populations, the equilibrium is not maintained. (2008)

Answer

Unit 6 – Genetics

Scientific basis of Mendel's experiments

(1)	2	(2)	4	(3)	3	(4)	all	(5)	2	(6)	3	(7)	4
(8)	4	(9)	3	(10)	4	(11)	4	(12)	5	(13)	4	(14)	4
(15)	1	(16)	1	(17)	4	(18)	2						

Inheritance of Mendelian traits in man.

(1)	5	(2)	4

Genetic patterns that deviate from mendel's laws.

(1)	2	(2)	1	(3)	4	(4)	2	(5)	4	(6)	4	(7)	2
(8)	4	(9)	2	(10)	3	(11)	all	(12)	3	(13)	3	(14)	4
(15)	3,4	(16)	3	(17)	1	(18)	3	(19)	2	(20)	1	(21)	4
(22)	4	(23)	1	(24)	3								

Changes in gene frequencies

(1)	2