Solution

CET25B4 PRINCIPLES OF INHERITANCE AND VARIATION

Class 12 - Biology

- 1. **(a)** (a), (b) and (c) are true **Explanation:** (a), (b) and (c) are true
- 2.

(c) Intermediate inheritance Explanation: Intermediate inheritance

3.

(c) X-chromosomal linked disease **Explanation:** X-chromosomal linked disease

- 4. (a) Inheritance of one geneExplanation: Inheritance of one gene
- 5.

(b) One of paired allelesExplanation: One of paired alleles

6.

(c) Incorrect

Explanation: Women are not responsible for the sex of children because they produce only one kind of gamete containing X-sex chromosome, on the other hand, males produce two kinds of sperms half containing X and half Y sex chromosomes.

7.

(d) The two genes are linked and present on the same chromosomeExplanation: The two genes are linked and present on the same chromosome

8. (a) Heterozygous

Explanation: Heterozygous

9.

(c) Klinefelter's syndrome Explanation: Klinefelter's syndrome

10.

Explanation: In our society, females are blamed for producing female children due to false notation. Although, male sperm decides the sex of the baby during fertilization.

11.

(b) Glutamic acid by valine at sixth position of beta chain of haemoglobin **Explanation:** Glutamic acid by valine at sixth position of beta chain of haemoglobin

12.

(b) observations that the offspring of a cross made between the plants having two contrasting characters shows only one character without any blending.

Explanation: When Mendel made a monohybrid cross, he observed in F1 generation that the offspring of the cross made between the plants having two contrasting characters shows only one character without any blending. This led him to conclude that characters are controlled by some discrete units.

13.

(d) Autosomal recessive inheritance

Explanation: Autosomal recessive inheritance.

14.

(b) Heteromorphic

Explanation: Sex chromosomes of human beings are heteromorphic as they are of different sizes. The X chromosome is smaller than the X chromosome in size.

⁽b) False notation

15.

).

(b) Two X and one YExplanation: Two X and one Y

16.

(c) Both sons and daughters.Explanation: Both sons and daughters.

17.

(b) Y

Explanation: Y

18.

(d) AlloploidyExplanation: Alloploidy

19.

(b) Malignant tumourExplanation: Malignant tumour

20. (a) Pleiotropic gene **Explanation:** Pleiotropic gene

21.

(c) Consanguineous marriageExplanation: Consanguineous marriage

22.

(b) 9 : 3 : 3 : 1 **Explanation:** 9 : 3 : 3 : 1

23.

(d) Mitochondria and inherited via egg cytoplasmExplanation: Mitochondria and inherited via egg cytoplasm

24.

(c) 44 autosomes + XO

Explanation: 44 autosomes + XO

25.

(c) X body

Explanation: The specific nuclear structure in few insects and 50 percent of the sperm observed by Henking was named as X body. Although its role in sex determination was not known to his time.

(a) I^Ai and I^Bi Explanation: I^Ai and I^Bi

27. (a) May be colour-blind or may be of normal visionExplanation: May be colour-blind or may be of normal vision

28.

(c) Quantitative interaction **Explanation:** Quantitative interaction

29.

(d) Mendelian trait

Explanation: The inheritance of Mendelian traits can be traced by pedigree analysis. Study of family history about the inheritance of a particular trait over generations in a family is called the pedigree analysis.

30.

(d) X-linked disorder

Explanation: X-linked disorder

31.

(c) Bird female

Explanation: Bird female

32. (a) I^AI^O; Blood type A
Explanation: I^AI^O; Blood type A

33.

(b) Euploidy

Explanation: Most of the organisms are diploid, contain two sets of chromosome (2n) but a number of organisms contain multiple of the chromosome set like 3n, 4n, 6n, etc. This condition of having multiple sets of chromosomes is called Euploidy.

34.

(c) Gene **Explanation:** Gene

35.

(d) $\frac{2}{16}$ Explanation: $\frac{2}{16}$

36.

(d) 1 : 2 : 1

Explanation: 1:2:1

When F1 individuals are self crossed, in the F_2 generation, 1 plant with red flowers(RR), 2 plants with pink flowers(Rr), 1 plant is with white flowers(rr) are formed. The phenotypic ratio is 1:2:1 and genotypic ration is 1:2:1.

37.

(b) 2n - 1 **Explanation:** 2n - 1

38.

(b) Terminal flower position

Explanation:

Trait	Dominant Expression	Recessive Expression
Form of ripe seed (R)	Smooth	Wrinkled
Color of seed albumen (Y)	Yellow	Green
Color of flower (P)	Purple	White
Form of ripe pods (I)	Inflated	Constricted
Color of unripe pods (G)	Green	Yellow
Position of flowers (A)	Axial	Terminal
Length of the stem (T)	Tall	Dwarf

39.

(d) Spontaneous mutations Explanation: Spontaneous mutations

40.

(b) Down's syndromeExplanation: Down's syndrome

41.

(c) The alleles of two genes are segregating independently.

Explanation: If we made a dihybrid cross between one homozygous dominant and one homozygous recessive parents then their F2 progeny will show the phenotypic ratio of 9:3:3:1. This shows that the two traits are inherited independently of each other in the cross.

42. (a) XO type of sex determines male sex in grasshopper.Explanation: XO type of sex determines male sex in grasshopper.

43.

(d) Turner's syndrome Explanation: Turner's syndrome

44.

(b) 44

Explanation: 44

45.

(d) Test cross

Explanation: Test cross

46.

(d) Physical association of two genes present on the same chromosome

Explanation: Linkage is the physical association of two genes present on the same chromosome. Genes located close to each other have a high linkage percentage.

47.

(d) Four Explanation: Four

48.

(d) $350 \rightarrow \text{red} : 350 \rightarrow \text{white}$ Explanation: $350 \rightarrow \text{red} : 350 \rightarrow \text{white}$

49.

(c) Birds

Explanation: Female heterogamety in the formation of different types of gametes in females. Although males produce the same types of gametes. In birds, the female have ZW sex chromosome and male have ZZ sex chromosome.

50.

(c) Klinefelter's syndromeExplanation: Klinefelter's syndrome

51. (a) R-S-T

Explanation: R-S-Tis correct sequence of gene on the chromosomes.

52.

(d) Caused by a change in base pair of DNA

Explanation: Caused by a change in base pair of DNA

53. (a) XO type of sex chromosomes determine male sex in grasshoppers

Explanation: XO type of sex chromosomes determine male sex in grasshoppers

54.

(d) Sports

Explanation: Sports

55.

(c) Both (a) and (c) are correct

Explanation: In some insects, XO type of sex determination is found in which some sperms bear X-chromosome whereas some do not. The numbers of male and female chromosomes are not equal. An egg fertilized by sperms having an X-chromosome becomes female.

56.

(d) 23

Explanation: In human beings, 23 pairs of chromosomes are present out of which 22 pairs are called autosomes and 1 pair is called sex chromosome.

57. (a) Green pod colour

Explanation: Green pod colour

58.

(b) pleiotropy

Explanation: When a gene shows two unrelated phenotypic expressions the phenomenon is known as pleiotropy.

59.

(c) Four Explanation: Four

60. (a) Colchicine Explanation: Colchicine

61.

(b) Asexually reproducing formsExplanation: Asexually reproducing forms

62.

(d) 1 : 2 : 1 Explanation: 1 : 2 : 1

63. (a) Type BExplanation: Type B

64.

(b) Down's syndrome

Explanation: Mendelian disorders are mainly determined by alteration or mutation in a single gene. These disorders are transmitted to the offspring on the same line as principles of inheritance. Down's syndrome is due to the presence of an additional copy of chromosome number 21.

65.

(b) Female

Explanation: Male produce two kinds of sperms, half carrying X and half-carrying Y sex chromosome besides 22 autosomes. If the ovum is fertilized by sperm carrying X chromosome the sex of the child developed is female.

66.

(c) 50% colourblindExplanation: 50% colourblind

67.

(d) Klinefelter's syndrome - 44 autosomes +XXYExplanation: Klinefelter's syndrome - 44 autosomes +XXY

68.

(b) All hybrid plants are tallExplanation: All hybrid plants are tall

69. (a) HomozygousExplanation: Homozygous

70.

(c) X chromosome Explanation: X chromosome

71.

(c) Consanguineous mating **Explanation:** Consanguineous mating is marriage between individuals who are closely related

72.

(**d**) Hybrid **Explanation:** Hybrid

73.

(c) Only one sex-linked gene for each character

Explanation: Somatic cells in human males contain 22 pairs of autosomes and 1 pair (XY) of the sex chromosome. The Y chromosome is smaller in size and does not have allelomorphic pair of the X chromosome. So, only one sex-linked gene is available for each character.

74.

(c) Alternative forms of a gene at a given locusExplanation: Alternative forms of a gene at a given locus

75.

(c) Absence of one of the X chromosome

Explanation: Turner's disease is a chromosomal disorder due to the absence of one of the X chromosomes. Such females are sterile as ovaries are rudimentary and lack secondary sexual characters.