Q1. A monohybrid cross between two heterozygous tall pea plants (Tt × Tt) will produce a phenotypic ratio of:

A. 3 tall : 1 dwarf
B. 1 tall : 3 dwarf
C. 1 tall : 1 dwarf
D. All tall

Answer: A
Explanation: Tt × Tt gives TT, Tt, Tt, and tt → 3 tall : 1 dwarf (phenotypic ratio).

Q2. The genotypic ratio obtained in a monohybrid cross of heterozygous parents is:

A. 3:1
B. 1:2:1
C. 2:1:1
D. 9:3:3:1

Answer: B
Explanation: The genotypes are TT, Tt, and tt → 1:2:1.

Q3. Which of the following traits in pea is recessive?

A. Round seed
B. Yellow seed coat
C. Green seed
D. Tall stem

Answer: C
Explanation: Green seed is recessive, while yellow is dominant.

Q4. Assertion (A): Mendel used pea plants for studying inheritance patterns.

Reason (R): Pea plants show a wide range of visible contrasting traits.

A. Both A and R are true, and R is the correct explanation of A
B. Both A and R are true, but R is not the correct explanation of A
C. A is true, R is false
D. A is false, R is true

Answer: A
Explanation: Mendel chose pea plants because of their distinct, easily observable traits.

Q5. In a test cross, if 50% offspring show dominant phenotype and 50% show recessive, the genotype of parent is:

A. Homozygous dominant
B. Heterozygous
C. Homozygous recessive
D. Cannot be determined

Answer: B
Explanation: A test cross with Tt × tt gives 1 tall : 1 dwarf.

Q6. Match the following terms with their correct definitions:

Column I	Column II
A. Allele	i. Alternate forms of a gene
B. Genotype	ii. Genetic constitution
C. Phenotype	iii. Observable character
D. Homozygous	iv. Identical alleles

Options:
A. A–i, B–ii, C–iii, D–iv
B. A–ii, B–i, C–iii, D–iv
C. A–iv, B–iii, C–ii, D–i
D. A–iii, B–ii, C–iv, D–i

Answer: A
Explanation: All terms match standard genetic definitions.

Q7. Which of the following statements is not correct?

A. Law of dominance explains the expression of only one of the parental characters in F_1 generation
B. Dihybrid cross gives 9:3:3:1 phenotypic ratio

C. Test cross determines the phenotype of an organism
D. Back cross can help determine the genotype of dominant phenotype

Answer: C
Explanation: Test cross determines genotype, not phenotype.

Q8. A dihybrid cross results in a phenotypic ratio of 9:3:3:1. This proves the law of:

A. Dominance
B. Segregation
C. Independent assortment
D. Incomplete dominance

Answer: C
Explanation: Independent assortment allows alleles of different genes to segregate independently.

Q9. In incomplete dominance, the F_1 phenotype is:

A. Like one parent only
B. Intermediate between both parents
C. Like both parents
D. Different from both parents

Answer: B
Explanation: In incomplete dominance, heterozygotes show blended/intermediate phenotype.

Q10. Which of the following shows codominance?

A. Pink flowers in snapdragon
B. MN blood group
C. Height in humans
D. Skin colour in humans

Answer: B
Explanation: MN blood group exhibits codominance of M and N alleles.

Q11. In case of ABO blood group, which alleles are codominant?

A. A and B
B. A and O
C. B and O
D. All three alleles are codominant

Answer: A
Explanation: A and B are codominant; O is recessive.

Q12. The genotype IAIB expresses:

A. Blood group A
B. Blood group B
C. Blood group O
D. Blood group AB

Answer: D
Explanation: IA and IB both are expressed → AB group (codominance).

Q13. A woman with blood group A marries a man with blood group B. Their child has O blood group. The genotypes of parents must be:

A. IAIA and IBIB
B. IAIO and IBIO
C. IAIA and IBIO
D. IAIO and IBIB

Answer: B
Explanation: Only IAIO × IBIO can produce a child with genotype IOIO (blood group O).

Q14. In Mendel's experiments, which character is an example of complete dominance?

A. Flower colour in snapdragon
B. Seed colour in pea
C. Coat colour in rabbit
D. Eye colour in Drosophila

Answer: B

Explanation: Yellow (dominant) × green → yellow in F_1 (complete dominance).

Q15. Which law states that alleles segregate during gamete formation and recombine during fertilisation?

A. Law of dominance
B. Law of segregation
C. Law of purity of gametes
D. Law of independent assortment

Answer: B
Explanation: Law of segregation (also called purity of gametes) is a universal principle.

Q16. Assertion (A): Male heterogamety is found in humans.

Reason (R): Human males produce two types of gametes, X and Y.

A. Both A and R are true, and R is the correct explanation of A
B. Both A and R are true, but R is not the correct explanation of A
C. A is true, R is false
D. A is false, R is true

Answer: A
Explanation: Human males are XY (heterogametic), producing both X- and Y-bearing sperms.

Q17. Which of the following organisms shows female heterogamety?

A. Human
B. Drosophila
C. Grasshopper
D. Bird

Answer: D
Explanation: In birds, males are ZZ (homogametic) and females are ZW (heterogametic).

Q18. In humans, sex is determined by:

A. Number of X chromosomes

B. Presence of Y chromosome
C. Ratio of X to autosomes
D. Number of autosomes

Answer: B
Explanation: Presence of Y chromosome determines male sex in humans.

Q19. In a normal human male, the 23rd pair of chromosomes is:

A. XX
B. YY
C. XY
D. XO

Answer: C
Explanation: XY is the sex chromosome pair in males.

Q20. Which condition results in a male with one X chromosome only?

A. Down syndrome
B. Turner syndrome
C. Klinefelter syndrome
D. None of these

Answer: D
Explanation: One X chromosome (XO) results in Turner syndrome, but that occurs in females. A male with one X only (no Y) doesn't develop as a normal male.

Q21. Match the genetic disorders with their cause:

Column I	Column II
A. Turner syndrome	i. Trisomy of chromosome 21
B. Down syndrome	ii. Monosomy of X chromosome
C. Klinefelter syndrome	iii. XXY condition in males
D. Sickle cell anaemia	iv. Point mutation in haemoglobin

Options:
A. A–ii, B–i, C–iii, D–iv
B. A–i, B–ii, C–iii, D–iv
C. A–ii, B–iii, C–i, D–iv
D. A–iv, B–i, C–iii, D–ii

Answer: A
Explanation: Genetic causes match as per standard classification.

Q22. Which of the following is a Mendelian disorder?

A. Down syndrome
B. Turner syndrome
C. Sickle cell anaemia
D. Cri-du-chat syndrome

Answer: C
Explanation: Sickle cell anaemia is caused by a single gene mutation → Mendelian.

Q23. Pedigree analysis is used to:

A. Confirm paternity
B. Determine birth defects
C. Study inheritance pattern in a family
D. Improve intelligence

Answer: C
Explanation: Pedigree helps track the inheritance of traits in generations.

Q24. Which symbol is used to represent an affected male in pedigree?

A. White square
B. White circle
C. Shaded square
D. Shaded circle

Answer: C
Explanation: Square = male; shaded = affected.

Q25. In a pedigree chart, a trait that appears in every generation is most likely:

A. Autosomal recessive
B. X-linked recessive
C. Autosomal dominant
D. Y-linked

Answer: C
Explanation: Dominant traits usually appear in every generation.

Q26. A child is born with sickle cell anaemia. Neither parent shows the disease. The trait is:

A. X-linked dominant
B. Autosomal recessive
C. Autosomal dominant
D. Y-linked

Answer: B
Explanation: Carriers are Aa; affected child is aa.

Q27. In ABO blood group, a child has blood group O. Which combination of parent blood groups is not possible?

A. A and B
B. A and O
C. B and B
D. AB and AB

Answer: D
Explanation: AB × AB cannot give O (since both parents lack O allele).

Q28. Which of the following is an example of polygenic inheritance?

A. Eye colour
B. Sickle cell anaemia
C. Colour blindness

D. Haemophilia

Answer: A
Explanation: Eye colour is controlled by more than one gene → polygenic.

Q29. Assertion (A): Colour blindness is more common in males.

Reason (R): It is an autosomal recessive disorder.

A. Both A and R are true, and R is the correct explanation
B. Both A and R are true, but R is not the correct explanation
C. A is true, R is false
D. A is false, R is true

Answer: C
Explanation: Colour blindness is X-linked, not autosomal.

Q30. In a pedigree, a trait is passed from father to all sons only. This is an indication of:

A. Autosomal dominant inheritance
B. Y-linked inheritance
C. X-linked dominant inheritance
D. Mitochondrial inheritance

Answer: B
Explanation: Y-linked traits are passed only from father to sons.

Q31. In codominance:

A. One allele is completely dominant over the other
B. Both alleles express partially
C. Both alleles express equally
D. Neither allele is expressed

Answer: C
Explanation: Codominance means equal expression of both alleles (e.g., AB blood group).

Q32. In incomplete dominance, the phenotype of F1 generation is:

A. Similar to dominant parent
B. Intermediate between both parents
C. Similar to recessive parent
D. Randomly inherited

Answer: B
Explanation: In incomplete dominance, F1 shows a blended/intermediate phenotype (e.g., pink flowers in snapdragon).

Q33. Which of the following traits is an example of pleiotropy?

A. ABO blood group
B. Sickle cell anaemia
C. Colour blindness
D. Down syndrome

Answer: B
Explanation: In pleiotropy, a single gene affects multiple traits — as in sickle cell anaemia, which affects shape of RBCs and oxygen-carrying capacity.

Q34. In a cross between two heterozygous tall plants (Tt × Tt), what is the genotypic ratio of offspring?

A. 1:2:1
B. 3:1
C. 2:1
D. 1:3

Answer: A
Explanation: TT:Tt:tt = 1:2:1 (genotypic ratio in monohybrid cross).

Q35. Which of the following disorders is not sex-linked?

A. Haemophilia
B. Colour blindness
C. Thalassemia
D. Duchenne muscular dystrophy

Answer: C
Explanation: Thalassemia is autosomal recessive, not sex-linked.

Q36. Which of the following combinations will produce a male child?

A. X egg × X sperm
B. X egg × Y sperm
C. Y egg × X sperm
D. Y egg × Y sperm

Answer: B
Explanation: Male (XY) child results from fusion of X (egg) and Y (sperm).

Q37. Match the following terms with their examples:

Column I Column II

A. Incomplete dominance i. Sickle cell anaemia
B. Codominance ii. AB blood group
C. Pleiotropy iii. Snapdragon flower
D. X-linked recessive iv. Haemophilia

Options:
A. A–iii, B–ii, C–i, D–iv
B. A–ii, B–i, C–iii, D–iv
C. A–iii, B–i, C–ii, D–iv
D. A–i, B–iii, C–iv, D–ii

Answer: A
Explanation: All examples match their respective concepts.

Q38. Assertion (A): In incomplete dominance, the heterozygote exhibits a phenotype intermediate between both homozygotes.

Reason (R): The dominant allele completely suppresses the recessive one.

A. Both A and R are true, and R is the correct explanation of A

B. Both A and R are true, but R is not the correct explanation of A
C. A is true, R is false
D. A is false, R is true

Answer: C
Explanation: R is incorrect. In incomplete dominance, no allele is completely dominant.

Q39. Which of the following is not an example of multiple allelism?

A. ABO blood group
B. Eye colour in humans
C. Sickle cell anaemia
D. Coat colour in rabbits

Answer: C
Explanation: Sickle cell anaemia is due to a single gene with two alleles — not multiple.

Q40. A normal couple has a son with haemophilia. What is the genotype of the mother?

A. X^HX^H
B. X^HX^h
C. X^hX^h
D. X^HY

Answer: B
Explanation: Carrier mother (X^HX^h) × normal father (X^HY) can produce haemophilic son (X^hY).

Q41. In dihybrid cross, how many of the F2 progeny are homozygous dominant for both traits?

A. 9
B. 3
C. 1
D. 4

Answer: C
Explanation: In 9:3:3:1 ratio, only 1 is homozygous dominant for both traits.

Q42. Which of the following is not a Mendelian exception?

A. Incomplete dominance
B. Codominance
C. Polygenic inheritance
D. Independent assortment

Answer: D
Explanation: Independent assortment is one of Mendel's original laws.

Q43. Which of the following is not correctly matched?

A. Colour blindness – X-linked recessive
B. Down syndrome – Trisomy 21
C. Thalassemia – Autosomal recessive
D. Klinefelter syndrome – Female with XO

Answer: D
Explanation: XO condition is Turner syndrome (female), not Klinefelter (which is XXY male).

Q44. A woman with blood group A marries a man with blood group B. Their child has blood group O. What are the genotypes of the parents?

A. IAIA and IBIB
B. IAi and IBi
C. IAi and IBIB
D. IAIA and IBi

Answer: B
Explanation: Only IAi × IBi can give rise to ii (O) offspring.

Q45. Assertion (A): Haemophilia is rarely observed in females.

Reason (R): A female must receive the defective gene from both parents to be affected.

A. Both A and R are true, and R is the correct explanation
B. Both A and R are true, but R is not the correct explanation
C. A is true, R is false
D. A is false, R is true

Answer: A

Explanation: True — since the disorder is X-linked recessive, a female needs two defective alleles to express it.