

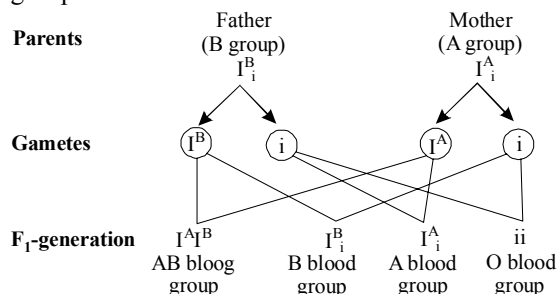
ANSWER KEYS

1	(b)	7	(d)	13	(a)	19	(d)	25	(a)	31	(b)	37	(d)	43	(d)	49	(b)	55	(c)
2	(c)	8	(a)	14	(c)	20	(c)	26	(b)	32	(b)	38	(a)	44	(d)	50	(c)	56	(a)
3	(b)	9	(c)	15	(c)	21	(c)	27	(c)	33	(d)	39	(b)	45	(a)	51	(b)	57	(c)
4	(b)	10	(c)	16	(b)	22	(b)	28	(c)	34	(d)	40	(c)	46	(b)	52	(a)	58	(b)
5	(b)	11	(a)	17	(b)	23	(c)	29	(a)	35	(b)	41	(a)	47	(d)	53	(c)	59	(b)
6	(c)	12	(a)	18	(d)	24	(a)	30	(a)	36	(b)	42	(d)	48	(b)	54	(b)	60	(b)



- (b)
- (c) After the transformation of spermatids into sperm, their heads become embedded in a cell called sertoli cells (X) and are finally released from the seminiferous tubule (Y) by the process called spermiation (Z).
- (b) When placenta fails to supply nutrients and oxygen to the body during the gestation period, this causes premature birth.
- (b)
- (b) 'B' are the secondary spermatocytes which further undergoes meiosis II to produce two haploid spermatids.
- (c) The coconut water from tender coconut is nothing but free nuclear endosperm (made up of thousands of nuclei) and the surrounding white kernel is the cellular endosperm. Female gametophyte is embryo sac.
- (d) The given figure is three dimensional cut section of anther. A typical angiosperm anther is bilobed with each lobe having two theca i.e., they are dithecous. Here P, Q and R are pollen sacs, pollen grains and filament respectively.
- (a) Development of male gametophyte is called micro-gametogenesis. One meiotic division and two mitotic divisions are necessary for the complete development of male gametophyte. Male gametophyte when fully developed is a 3 nucleate structure.
- (c) In a seed of maize, the scutellum is considered as cotyledon because it absorbs food materials and supplies them to the embryo.
- (c) Chalazogamy
Such type of fertilization in which pollen tube enter into the embryo sac through the chalaza is called chalazogamy.
- (a) Synergids bear prominent structure called 'filiform' apparatus which are finger like projections. This apparatus is present in upper part of each synergid. This apparatus is useful for the absorption and transportation of materials from the nucellus to the embryo sac.

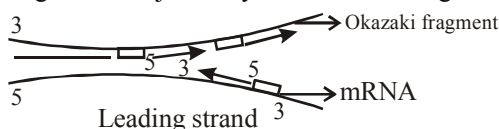
- (a) 13. (a) 14. (c)
- (c) When a cross is carried out between heterozygous father (for blood group B) and heterozygous mother (of blood group A) to get four children with different blood groups.




All the four blood group are controlled by three allelic gene I^A , I^B , i and thus it shows phenomenon of multiple allelism, Both I^A and I^B is dominant over i . However, when both the alleles are dominant and show the phenomenon of codominance, forming the blood group AB, six genotypes are possible with combination of these three alleles. Thus, other options are incorrect.

- (b) Incomplete dominance results in the progeny's expressing an intermediate form of the two parental alleles. (In a cross between red-flowered plants and white-flowered plants, the expression of pink-flowered plants would be a "blend" of the parental traits). Codominance is not an example of blending because both alleles are fully expressed in the individual.
- (b) Since the offspring number 11 is affected (diseased), either of the two parents (6 or 7) have to be affected.
- (d) Haemophilia is an X-linked trait, and can only be inherited by the son from his mother's X-chromosome. The father contributes the Y-chromosome to his son (not his X-chromosome) and thus cannot pass any of his X-linked alleles to his son.

19. (d) On template strand which has 5' → 3' orientation, DNA polymerase synthesizes short pairs on new DNA (about 1000 nucleotide long) in 5' → 3' direction and then joins these piece together. These small fragments are called **okazaki fragments** and new DNA strand made in this discontinuous manner is called **lagging strand**. Okazaki fragments are joined by means of DNA ligase.



20. (c) In capping, unusual nucleotide (methyl guanosine triphosphate) is added to 5' end of hn-RNA and forms cap. CCA segment is also added to t-RNA as terminal addition for specific function.
21. (c) The process of protein synthesis is catalyzed by ribosomal RNA. Messenger RNA provides the genetic blueprint for the protein. Transfer RNA is responsible for translating the triplet code into a specific amino acid. Messenger RNA molecules are modified prior to protein synthesis by small nuclear RNA.
22. (b) tRNA or transfer RNA is a single stranded molecule and takes the shape of a clover leaf. In the process of transcription tRNA brings amino acid and reads the genetic code and acts as an adapter molecule. In the given structure of tRNA, the labels A, B, C and D are respectively AA binding site (amino acid binding site), T ψ C loop, anticodon loop (codon recognition site) and DHU loop (amino acid recognition site).
23. (c) Jacob and Monod proposed the *lac* operon of *E. coli*. The *lac* operon contains a promoter, an operator, and three structural genes called Z, Y, and A, coding for the enzyme, β galactosidase, permease and transacetylase respectively. The *lac* regulator gene, designated as *i* gene, codes for repressor. In the absence of the inducer, the repressor binds to the *lac* operator, preventing RNA polymerase from binding to the promoter and thus transcribing the structural gene.
24. (a) The function of sigma factor is to confer the specificity of RNA synthesis at the promoter site. But during elongation of polypeptide chain, sigma factor is functionless.
25. (a) Assertion and Reason are correct and the Reason is a correct explanation of Assertion. In the DNA fingerprinting technique, satellite DNA acts as probe that shows very high degree of polymorphism. It was called as Variable Number of Tandem Repeats (VNTR).
26. (b) Assertion and Reason are correct but Reason is not a correct explanation of Assertion. The human Genome project was started in 1990 and was completed in 2003.
27. (c) Assertion is true but Reason is false. Hepatitis B, genital herpes and HIV infections caused by Hepatitis B virus, Herpes simplex type 2 virus and Human Immuno deficiency virus (HIV) respectively. These diseases are difficult to cure.
28. (c) Assertion is true but Reason is false. Condom should be discarded after a single use. It is also a safeguard against infection of AIDS and sexual diseases.
29. (a) The structure marked as X is rete testis. The rete testis is an seminiferous network of delicate tubules located in the hilum of the testicle (mediastinum testis) that carries sperm from the seminiferous tubules to the efferent ducts.
30. (a) The urethra originates from a structure [called urinary bladder (X)] and extends through the male external genitalia [called penis (Y) which helps in introducing semen into the vagina] to its external opening called urethral meatus.
31. (b)
32. (b) Graafian follicle releases secondary oocyte from the ovary by the process of ovulation. Primary oocyte within the tertiary follicle grows in size and completes its first meiotic division.
33. (d) AIDS, genital herpes and hepatitis B are sexually transmitted diseases which are not completely curable.
34. (d)
35. (b) Gamete Intrafallopian Transfer technique is used for such females who cannot produce ovum. This method involves the transfer of ovum collected from a donor into the fallopian tube of another who cannot produce egg but provide a suitable environment for fertilisation.
36. (b) The crossing of F₁ to homozygous recessive parent is called test cross. Test cross is a cross between two individuals in which one individual shows the dominant phenotype of a characteristic and the other individual who is homozygous recessive for that trait in order to determine the genotype of the dominant individual.
37. (d) It is determined by the ratio of number of X-chromosomes to the number of autosomal sets.
38. (a)
39. (b) Fig (b) In sickle-cell anaemia, the cell of the RBC changes its shape from concave disc to elongated sickle like structure.
40. (c) 41. (a)
42. (d) RNA used to act as a genetic material as well as a catalyst (in some important biochemical reactions). But, RNA being a catalyst is reactive and unstable.
43. (d) RNA and DNA both are genetic material and carry genetic information from one generation to other. A virus is a small parasite that cannot reproduce by itself. Most viruses have either RNA or DNA as their genetic material. Once a virus infects a susceptible cell, it can direct the cell machinery to produce more viruses.
44. (d) The given figure represents the figure of replication fork of DNA. The new strands of DNA are formed in the 5' → 3' direction from the 3' → 5' template DNA by the addition of deoxyribonucleotides to the 3' end of primer RNA.
45. (a) Inducible system includes a repressor protein which is bound to DNA in the absence of any other factor.

46. (b) Human genome project was launched in the year 1990. It is an international scientific research project having the goal to determine the sequence of base pairs which make up human DNA, and to identify and map all of the genes of the human genome.
47. (d) Polymorphism in DNA sequence is a variation at genetic level. It arises due to mutation and is the basis of genetic mapping of human genome as well as of DNA fingerprinting.
48. (b) In the given figure, the step shown is termination of transcription in bacteria. The label A, B and C are respectively RNA, RNA polymerase and rho factor. RNA polymerase is an enzyme that synthesizes the formation of RNA from a DNA template during transcription. Rho factor is a termination factor which releases RNA from the DNA template.
49. (b) 50. (c) 51. (b) 52. (a) 53. (c)
54. (b) 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 one X-chromosome. The male has one chromosome only and is heterogametic. It produces 2 types of sperms : gynospers with X and androsperms without X. In grasshopper, the males lack Y-sex chromosome and have only an X-chromosome besides autosomes whereas females have a pair of X-chromosomes. Male produce sperm cells that contain either an X-chromosome or no sex chromosome, which is designated as O.
55. (c) In the given figure of sex chromosomes, gene a and b present on X chromosomes represent disorders-haemophilia and red green colour blindness. Both these disorders occur due to recessive sex linked genes present on sex chromosomes. Red green colour blindness is more common in males than females due to presence of only one X chromosomes. The sufferers are not able to distinguish red and green colour.
56. (a) Nucleosome is a structural unit of a eukaryotic chromosome which consists of a length of DNA coiled around a core of histones and are thought to be present only during interphase of cell cycle. In the given figure of nucleosome structure, the parts marked as A, B and C are respectively DNA, H1 histones and histone octamer.
57. (c) In R, the fallopian tubes have been blocked, and in S, they are cut out. Both the procedures completely make it impossible for fertilization to occur.
58. (b) Fig (b) is a wind pollinated plant showing compact inflorescence and well exposed stamens. Pollination by wind is more common amongst abiotic pollinations. Wind pollination also requires that the pollen grains are light, small, dry and non-sticky so that they can be transported in wind currents. Both the stigmas and anthers are exserted. Anthers are versatile, stigma is hairy, feathery or branched to catch the wind borne pollen grains.
59. (b) Spermatogonia are undifferentiated germ cells which originate in seminiferous tubules and divide into two primary spermatocytes (a kind of germ cell) in the production of spermatozoa.
60. (b) 
- The given figure shows the concept of central dogma of molecular biology. In this question A is transcription, B - translation.