

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



- (d) A typical microsporangium is generally surrounded by four-wall layers, *i.e.*, the epidermis (outermost protective layer) endothecium, (middle fibrous layers) and the tapetum (innermost nutritive layer).
- (d) 3. (a)
- (a) The formation of seedless fruits without fertilisation is parthenocarpy. The fruits developed from unfertilised ovary are called parthenocarpic fruits.
- (c) 6. (a) 7. (b) 8. (a)
- (a) Seminal plasma in human males are rich in fructose, calcium and certain enzymes. They provide a medium for transport of sperms, nourishes and activates sperms.
- (c) 11. (a)
- (b) All the genes, present on a particular chromosome form a linkage group. The number of linkage group of a species correspond to the total number of different chromosome of that species. It is not simply the number of chromosome in haploid set.
- (a) **Non-homologous Chromosome:** The law of independent assortment holds true as long as two different genes are on separate chromosomes. When the genes are on separate chromosome, the two alleles of one gene (A and a) will segregate into gametes independently of the two alleles of the other gene (B and b).
- (b) Haemophilia is sex linked recessive disease in which a simple protein that is a part of protein cascade involved in clotting of blood is affected. Due to this, in an affected individual a simple cut will result in non stop bleeding.
- (c) Crossing over leads to recombination of genetic material on the two chromosomes. Mutation results in alternation of DNA sequences and consequently results in change in the genotype and the phenotype of an organism. In addition to recombination, mutation is another phenomenon that leads to variation in DNA.
- (d) Mutation can be induced by gamma radiation.
- (c)
- (d) Mendel conducted hybridization experiments for 7 years on Pea plant between 1856 to 1863 and his data was published in 1865.
- (c) Option (a) describes transcription in eukaryotic cells; Option (b) describes translation.
- (d) Chargaff found that the relative ratios of purine to pyrimidines were equal. Adenine and guanine are purines and cytosine and thymine are pyrimidines; therefore, ratios of adenine and thymine should be equal. Chargaff also found that there is no conserved ratio between specific pairs (e.g., A + T and G + C).
- (b) 22. (c) 23. (c)
- (b) The combination of pentose sugar with nitrogenous bases (purines or pyrimidines) is called nucleoside. Examples are adenosine, guanosine, cytidine, thymidine and uridine.
- (c) Assertion is true but Reason is false. Success rate of test tube baby is less than 20%.
- (b) Assertion and Reason are true, but Reason is not the correct explanation of Assertion. Gonadotropin releasing hormone (GnRH) is a hypothalamic hormone.
- (c) Assertion is true but Reason is false. Sperms reach the epididymis and stay there for 8-17 days for maturation.
- (b) Assertion and Reason are true, but Reason is not the correct explanation of Assertion. The acrosome is filled with enzymes that help in fertilisation of the ovum.

29. (b) The vas deferens is a continuation of the cauda epididymis. It is about 40 cm long and enters the abdominal cavity through the inguinal canal. Then, it passes over the urinary bladder, curves round the ureter and joins a duct from seminal vesicle and opens into urethra as the ejaculatory duct. These ducts store and transport the sperms from the testis to the outside through urethra.

30. (a) Spermiation is the process of release of spermatozoa from Sertoli cells into the cavity of the seminiferous tubules. From here, sperms pass through vasa efferentia into the epididymis for temporary storage.

31. (b) 32. (a) 33. (b) 34. (b) 35. (a) 36. (d)

37. (b) Husband \times Wife
 $I^A I^B$ $I^A i$

$\begin{matrix} O \\ + \end{matrix}$	$\begin{matrix} \sigma \\ \searrow \end{matrix}$	I^A	I^B
I^A		$I^A I^A$	$I^A I^B$
i		$I^A i$	$I^B i$

Number of genotypes = 4
 Number of phenotypes = 3
 $I^A I^A$ and $I^A i$ = A
 $I^A I^B$ = AB
 $I^B i$ = B

38. (d) Sickle cell disease is inherited in an autosomal recessive pattern.

39. (a)

40. (c) Pleiotropy is a phenomenon in which a single gene may express more than one trait. Sometimes, one trait will be very evident and other will be less evident, e.g., a gene for white eye in *Drosophila* also affect the shape of organs is male responsible for sperm storage as well as other structures.

Multiple allelism is a series of three or more alternative or allelic forms of a gene, that can occupy the same locus.

Mosaicism is the occurrence of cells that differ in their genetic component from other cells of the body.

Polygeny refers to a single characteristics that is controlled by more than two genes. (It is also known as multifactorial inheritance).

41. (c)

42. (a) The nucleosome model explains the packaging of histone proteins and DNA in the chromatin material which forms the chromosome.

43. (c) 44. (c)

45. (d) Down's syndrome is caused by non-disjunction of 21st chromosome i.e. Trisomy.

46. (c) According to Mendel's law of Dominance, out of two contrasting allelomorphous factors only one expresses itself in an individual. The factor that expresses itself is called

dominant while the other which has not shown its effect in the heterozygous individual is termed as recessive. The option (c) in the given question cannot be explained on the basis of law of dominance. It can only be explained on the basis of Mendel's Law of independent assortment, according to which in a dihybrid cross, the two alleles of each character assort independently of the alleles of other character and separate at the time of gamete formation.

47. (b) If 30% of DNA is adenine, then by Chargaff's rule 30% will be thymine. The remaining 40% of the DNA is cytosine and guanine. Since the ratio of cytosine to guanine must be equal, then each accounts for 20% of the bases.

48. (b)

49. (c) Spermatogenesis is the process of the production of mature sperms from spermatogonia, while oogenesis is the process of the formation of mature female gametes from oogonia.

50. (d) Oogenesis starts right from the embryonic development stage. Oogonia divide to form primary oocytes that are arrested at Prophase I.

51. (a) Oogonia are formed during fetal development. Soon they start undergoing meiosis but are arrested at Prophase I awaiting further cues of division. Oogonia at this stage are called primary oocytes.

52. (c) Oogenesis is the production of a haploid secondary oocyte from a diploid oogonium and in the process resulting in the production of two polar bodies, each of which is haploid. Naturally, a tetraploid person having tetraploid oogonia will produce diploid polar bodies and a diploid oocyte

53. (b) Asymmetric division refers to the unequal distribution of cytoplasm between the daughter cells. Primary oocyte undergoes the first round of meiosis, producing a large haploid secondary oocyte and a tiny first polar body. Thus this is an instance of asymmetric division.

54. (a) The diploid oogonium goes through the first round of meiosis to form primary oocyte, which is arrested at Prophase I. Thus, the primary oocyte is also diploid. The division is completed after the formation of the secondary oocyte, which is haploid. The secondary oocyte undergoes another round of meiosis to form haploid ovum.

55. (b) 56. (c)

57. (c) The pedigree points to autosomal dominant inheritance with two generation involvement and male to male transmission II 2 has inherited both the disease and allele B from his father. Therefore if III 1 inherits allele A from her father the probability that she will be affected equals 0 if there is no recombinant or 0.04 if the recombination fraction = 0.04.

58. (a) 59. (b) 60. (c)