10th Science Lesson 18 Questions in English

18] Genetics

1. Assertion (A): The Genes transfer the characters of parents to the next generation.
Reasoning(R): Genes are responsible for the physical outlook and all the biological functions.
a) Both A and R is True and R is the correct explanation of A.
b) Both A and R is True but R is not the correct explanation of A.
c) A is True but R is False.
d) Both A and R is False.
Explanation
We inherit characters from one generation to another. It is because of the genes we inherit from our parents. These genes are responsible for the physical outlook and biological functions.

2. Which of the following is not dealt with the study of genetics?
a) Genes
b) Genetic variation
c) Economic status
d) Heredity of organisms
Explanation
The branch of biology that deals with the genes, genetic variation and heredity of living organisms is called genetics.

3. Choose the Incorrect statements.
i) Heredity is called as the character transmission from one generation to next generation.
ii) Chromosomes of the living organisms are responsible for the heredity and the variations in the off springs.
iii) Variation refers to the differences in the individuals of different species of off springs and the parents.
a) i only
b) ii only
c) iii only
d) None of the above
Explanation
Heredity is transmission of characters from one generation to the next generation while variation refers to the differences shown by the individuals of the same species and also by the offspring of the same parents. All these can happen only due to chromosomes.

4. Who discovered the basic principles of heredity?
a) Gregor Mendel

b) John Ray
c) Carolus Linnaeus
d) Adolf Engler
Explanation
Mendel (1822-1884) was an Austrian monk who discovered the basic principles of heredity through his experiments.

5. Which of this plant was used by Mendel for the heredity experiments?
a) Mushrooms
b) Pea plant
c) Beans
d) Grass
Explanation
The reasons for Mendel's success are he chose the pea plant as it was advantageous for experimental work in many aspects. His experiments are the foundation for modern genetics.

6. Which of these characters is not an advantage of the pea plant?
a) Naturally self-pollinating
b) Long life span
c) Bisexual flowers
d) Defined contrasting characters
Explanation
The advantages of the pea plant are, it is naturally self-pollinating and so is very easy to raise pure breeding individuals. It has a short life span as it is an annual and so it was possible to follow several generations. It is easy to cross-pollinate. It has deeply defined contrasting characters. The flowers are bisexual.

7. How many pairs of contrast characters was chosen by Mendel for his study?
a) 10
b) 7
c) 5
d) 8
Explanation
Mendel had chosen 7 pairs of contrasting characters for his study as shown in the table.

Characteristic studied	Dominant character	Recessive character
Stem length	Long 	Short 
Flower Position	Axillary 	Terminal 
Flower colour	Blue 	White 
Pod shape	Inflated 	Constricted 
Pod colour	Green 	Yellow 
Seed shape	Round 	Wrinkled 
Seed colour	Yellow 	Green 

8. Which of these are called as the monohybrid cross?
a) Inheritance of one pair of character.
b) Inheriting two pairs of same characters.
c) Inheritance of one pair of contrasting characters.
d) Inheritance of three pairs of same characters.
Explanation
Crosses involving inheritance of only one pair of contrasting characters are called monohybrid crosses. For example it is a cross between two forms of a single trait like a cross between tall and dwarf plant.

9. What is the character of the F1 generation obtained by Mendel's Monohybrid Cross parental experiments?
a) Tall and Monohybrid
b) Round seeds and Monohybrid
c) Blue colored flower
d) All the above
Explanation
Mendel's Explanation of Monohybrid Cross Parental generation: Pure breeding tall plant and a pure breeding dwarf plant. F1 generation: Plants raised from the seeds of pure breeding parental cross in F1 generation were tall and monohybrids.

10. Choose the Incorrect statements regarding the monohybrid experiments by Mendel.
i) The Selfing of the F1 monohybrids resulted in the F2 generation plants.

ii) The F2 generation of monohybrid cross experiment resulted with round seed and blue colored plant.
iii) External expression of the particular trait is called as phenotype and its ratio is 3:1 for the monohybrid experiment done by Mendel.
a) i only
b) ii only
c) iii only
d) All the above
Explanation
F2 generation: Selfing of the F1 monohybrids resulted in tall and dwarf plants respectively in the ratio of 3:1. The actual number of tall and dwarf plants obtained by Mendel was 787 tall and 277 dwarf. External expression of a particular trait is known as phenotype. So the phenotypic ratio is 3:1.

11. How many types of plants were obtained by the Mendel's Monohybrid experiement?
a) 2
b) 5
c) 3
d) 4
Explanation
In the F2 generation 3 different types were obtained:
Tall Homozygous – TT (Pure) – 1
Tall Heterozygous – Tt – 2
Dwarf Homozygous – tt – 1

12. What is the genotypic ratio of the F2 generation obtained by the Mendel's monohybrid experiment?
a) 1:3:3:1
b) 1:1:2
c) 1:2:1
d) 3:1
Explanation
A genotype is the genetic expression of an organism. The genotypic ratio of F2 generation obtained by Mendel was 1:2:1.

13. Which of the following are the observations made by Mendel's experiments?
i) Some of the factors are passed on from one generation to another.
ii) The contrasting factors of the generation occur in pairs and may be different from the breeding plants.
a) i only

b) ii only
c) Both i and ii
d) Neither i nor ii

Explanation

Based on the observations it was confirmed by Mendel that 'factors' are passed on from one generation to another, now referred to as genes. Tallness and Dwarfness are determined by a pair of contrasting factors tall plant possess a pair of factors (represented by T- taking the first letter of the dominant character) and a plant is dwarf because it possess factors for Dwarfness (represented as t- recessive character).

14. Assertion (A): The homozygous pairs are alike the pure breeding plants.
Reasoning(R): The Unlike pair of plants from the parents are called as Heterozygous.

a) Both A and R is True and R is the correct explanation of A.

b) Both A and R is True but R is not the correct explanation of A.
c) A is True but R is False.
d) Both A and R is False.

Explanation

The contrasting factors occur in pairs and may be alike as in pure breeding tall plants (TT) and dwarf plants (tt). This is referred to as homozygous. If they are unlike (Tt) they are referred to as heterozygous.

15. Choose the correct statements.
i) The two factors making up a pair of same characters are called as alleles.
ii) Phenotype expression of alleles is called as Allelomorphs.
iii) Both the members of each pair are contributed by the dominant parent.
a) i only

b) ii only

c) iii only
d) None of the above

Explanation

Two factors making up a pair of contrasting characters are called alleles. Phenotypic expressions of alleles are called allelomorphs. One member of each pair is contributed by one parent.

16. Assertion (A): Fertilization brings the two different factors of alternative expression together in a trait.
Reasoning(R): Dominant condition expresses its character by itself and recessive condition masks the character.

a) Both A and R is True and R is the correct explanation of A.

b) Both A and R is True but R is not the correct explanation of A.
c) A is True but R is False.

d) Both A and R is False.

Explanation

When two factors for alternative expression of a trait are brought together by fertilization the character which expresses itself is called dominant (Tallness) condition and that which is masked is called recessive condition (Dwarfness).

17. Choose the Incorrect statements.

i) The Gametes gets both the alternative factors from the fertilization process.

ii) The Tallness or dwarfness factor is separate entities present inside a gamete.

iii) The F1 hybrids are self-crossed to produce the two entities separate and unite independently.

a) i only

b) ii only

c) iii only

d) None of the above

Explanation

The factors are always pure and when gametes are formed, the unit factors segregate so that each gamete gets one of the two alternative factors. It means that factors for tallness (T) and dwarfness (t) are separate entities and in a gamete either T or t is present. When F1 hybrids are self-crossed the two entities separate and then unite independently, forming tall and dwarf plants.

18. Which of the following statements are not correct regarding the Punnett square?

a) R.C.Punnett devised the Punnett square for the study of genetics.

b) Punnett square is a checker board form graphical representation.

c) Punnett square is a mathematical formula used for predicting the genitival off springs.

d) It is used to calculate the probability of all possible genotypes of off springs in a genetic cross.

Explanation

Punnett square is a checker board form devised by a British geneticist R.C.Punnett for study of genetics. It is a graphical representation to calculate the probability of all possible genotypes of off springs in a genetic cross.

19. Which of this following characters was chosen by Mendel for Dihybrid cross inheritance?

a) Tall and dwarf

b) Shape and color of seed

c) Flower position and color

d) Pod shape and color

Explanation

Di hybrid cross involves the inheritance of two pairs of contrasting characteristics (or contrasting traits) at the same time. The two pairs of contrasting characteristics chosen by Mendel were shape and color of seeds: round-yellow seeds and wrinkled-green seeds.

20. Which of these plants were produced in the first generation in the Mendel's Dihybrid cross experiment?

a) Round yellow seeds

b) Wrinkled yellow seeds

c) Round green seeds

d) Wrinkled green seeds

Explanation

Mendel crossed pea plants having round yellow seeds with pea plants having wrinkled green seeds. Mendel made the following observations: Mendel first crossed pure breeding pea plants having round-yellow seeds with pure breeding pea plants having wrinkled green seeds and found that only round yellow seeds were produced in the first generation (F1). No wrinkled-green seeds were obtained in the F1 generation. From this it was concluded that round shape and yellow color of the seeds were dominant traits over the wrinkled shape and green color of the seeds.

21. Which of these combinations were not obtained in the second generation of Mendel's Dihybrid experiment?

a) Round yellow seeds

b) Inflated yellow pods

c) Wrinkled green seeds

d) Wrinkled yellow seeds

Explanation

When the hybrids of F1 generation pea plants having round-yellow seeds were cross-bred by self-pollination then four types of seeds having different combinations of shape and color were obtained in second generation or F2 generation. They were round yellow, round-green, wrinkled yellow and wrinkled-green seeds.

22. State the phenotype Dihybrid ratio of Mendel's experiment?

a) 9:3:1

b) 9:3

c) 9:3:3:1

d) 1:3

Explanation

The ratio of each phenotype (or appearance) of seeds in the F2 generation is 9:3:3:1. This is known as the Dihybrid ratio.

23. Which of the following results were obtained by Mendel's Dihybrid cross experiment?

i) Two types of off springs were produced by second generation dihybrid cross.

ii) Four new combinations of traits with green, round, wrinkled and yellow seed appeared in F2 generation.

iii) The F2 generation contains 9 with two dominant traits and one with two recessive traits.

iv) The second generation had 3 plants with one dominant trait and one recessive trait and 3 with another dominant trait and another recessive trait.

a) i, ii only

b) iii, iv only

c) i, iii, iv only

d) ii, iv only

Explanation

Results of a Dihybrid Cross: Mendel got the following results from his dihybrid cross Four Types of Plants: A dihybrid cross produced four types of F2 off springs in the ratio of 9 with two dominant traits, 3 with one dominant trait and one recessive trait, 3 with another dominant trait and another recessive trait and 1 with two recessive traits. New Combination: Two new combinations of traits with round green and wrinkled yellow had appeared in the dihybrid cross (F2 generation).

24. Which of the following is the Law of Dominance?

a) Two homozygous individuals crossed the dominant characters appear in F1.

b) Heterozygous individuals are selfed and the recessive characters appear in F1.

c) Both Homozygous and Heterozygous characters are in F1.

d) All the above

Explanation

Law of Dominance: "When two homozygous individuals with one or more sets of contrasting characters are crossed, the characters that appear in the F1 hybrid are dominant and those that do not appear in F1 are recessive characters".

25. How many factors enter the gamete when a pair of two contrasting factors brought in F1?

a) None

b) Two

c) One

d) Three

Explanation

Law of Segregation or Law of purity of gametes: "When a pair of contrasting factors are brought together in a F1 hybrid. The two factors of the allelic pair remain together without mixing and when gametes are formed, the two separate out, so that only one enters each gamete."

26. Define the law of independent assortment.

a) Inheritance of two pairs will assort a single pair of genes of the other pair.

b) Inheritance of two or more pairs simultaneously, genes of one pair assort out independently of the other pair.

c) Only one factors of the gene will be present in the first generation if two pairs are inherited simultaneously.

d) None of the above.

Explanation

Law of independent assortment: "In case of inheritance of two or more pairs of characters simultaneously, the factors or genes of one pair assort out independently of the other pair."

27. For which of these discoveries T.H.Morgan was awarded Nobel Prize in the year 1993?

a) Determining the role of chromosomes in heredity.

b) Role of mutation.

c) Law of purity of gametes.

d) Structure of DNA.

Explanation

T.H. Morgan was awarded Nobel Prize in 1993 for determining the role of chromosomes in heredity.

28. Who coined the term chromosome in 1888?

a) Waldeyer

b) T.H.Morgan

c) Linnaeus

d) Mendel

Explanation

The human body is made up of million cells. The nucleus of each cell contains thin thread like structures called chromosomes. The term 'chromosomes' was first coined by Waldeyer in 1888.

29. Which of these contain the heredity information?

a) Nerves

b) Blood cells

c) Chromosomes

d) Nucleus

Explanation

The chromosomes are the carrier of genetic material which contains the heredity information.

30. Choose the correct statements.

i) Chromosomes are highly condensed coiled chromatin fibers packed with the DNA.

ii) Genes are the segments of DNA which is responsible for the inheritance of a particular character.

a) i only

b) ii only

c) Both i and ii

d) Neither i nor ii

Explanation

The chromosomes are highly condensed coiled chromatin fibres packed with the DNA (Deoxyribonucleic acid) that forms the genetic material. Genes are segments of DNA, which are responsible for the inheritance of a particular phenotypic character.

31. In which of these the gene is present on a chromosome?
a) Layer
b) Locus
c) Wall
d) Nucleus
Explanation
Each gene is present at a specific position on a chromosome called its locus. During cell division, the genetic information present in the genes is passed from one generation to another.

32. Choose the correct statements.
i) Chromosomes are thin, long and thread like structures consists of two identical strands.
ii) Each chromatid is made up of spirally coiled thin structure called chromonema.
iii) The sister chromatids are held together by the centromere.
a) i only
b) ii only
c) iii only
d) All the above
Explanation
The chromosomes are thin, long and thread like structures consisting of two identical strands called sister chromatids. They are held together by the centromere. Each chromatid is made up of spirally coiled thin structure called chromonema.

33. Name the bead like structures in the chromosomes?
a) Chromatid
b) Chromonema
c) Centromere
d) Chromomeres
Explanation
The chromonema has number of bead-like structures along its length which are called chromomeres.

34. Which of these makes the chromosomes?
a) DNA and RNA
b) Chromosomal protein
c) Metallic ions
d) All the above
Explanation
The chromosomes are made up of DNA, RNA, chromosomal proteins (histones and non-histones) and certain metallic ions. These proteins provide structural support to the chromosome.

35. Which of the following is not true regarding the primary constriction region of chromosome?
a) Two arms of a chromosome meet at a point called primary constriction.
b) Centromere region spindle fibers attach to the chromosomes during cell division.
c) Primary constriction is also known as the Nuclear region.
d) Primary constriction is also known as the centromere.
Explanation
A chromosome consists of the following regions: Primary constriction: The two arms of a chromosome meet at a point called primary constriction or centromere. The centromere is the region where spindle fibres attach to the chromosomes during cell division.

36. What is the significance of the Secondary constriction of a chromosome?
a) Nuclear zone
b) Nucleolar organizer
c) Formation of the nucleolus in the nucleus
d) All the above
Explanation
Secondary constriction: Some chromosomes possess secondary constriction at any point of the chromosome. They are known as the nuclear zone or nucleolar organizer (formation of nucleolus in the nucleus).

37. Which of these provides the stability to the chromosomes?
a) Telomere
b) Centromere
c) Nucleolus
d) Chromatids
Explanation
Telomere: The end of the chromosome is called telomere. Each extremity of the chromosome has a polarity and prevents it from joining the adjacent chromosome. It maintains and provides stability to the chromosomes.

38. Name the chromosomes with satellites at one end?
a) Sat-chromosomes
b) Telomere
c) Sister strand
d) Centromere
Explanation
Satellite: Some of the chromosomes have an elongated knob-like appendage at one end of the chromosome known as satellite. The chromosomes with satellites are called as the sat-chromosomes.

39. What is the main function of the Telomeres?
a) Aging clock in every cell.
b) Carry the inherited characters.
c) Energy provider.
d) Mutation agent.
Explanation
Telomeres act as aging clock in every cell. Telomeres are protective sequences of nucleotides found in chromosomes. As a cell divides every time they become shorter. Telomeres get too short to do their job, causing our cells to age.

40. Which of the following is not a type of centromere?
a) Telocentric
b) Nucleocentric
c) Acrocentric
d) Metacentric
Explanation
Based on the position of centromere, the chromosomes are classified as Telocentric, Acrocentric, Sub metacentric and Metacentric.

41. Match

A. Metacentric	i) One end
B. Acrocentric	ii) Proximal end
C. Sub-metacentric	iii) Center
D. Telocentric	iv) Near the center

a) i, iii, iv, ii
b) ii, iv, iii, i
c) iii, i, iv, ii
d) iv, i, iii, ii
Explanation
Telocentric– The centromere is found on the proximal end. They are rod shaped chromosomes.
Acrocentric – The centromere is found at the one end with a short arm and a long arm. They are also rod-shaped chromosomes.
Sub metacentric – The centromere is found near the center of the chromosome thus forming two unequal arms. They are J shaped or L shaped chromosomes.
Metacentric – The centromere occurs in the center of the chromosome and form two equal arms. They are V shaped chromosomes.

42. Which of these are the J shaped chromosomes?
a) Telocentric
b) Sub metacentric

c) Metacentric
d) Acrocentric
Explanation
Sub metacentric – The centromere is found near the center of the chromosome thus forming two unequal arms. They are J shaped or L shaped chromosomes.

43. Choose the Incorrect statements.
i) The eukaryotic chromosomes are classified into autosomes and allosomes.
ii) Autosomes contain genes that determine the somatic (body) characters.
iii) Male and female have unequal number of autosomes.
a) i only
b) ii only
c) iii only
d) None of the above
Explanation
The eukaryotic chromosomes are classified into autosomes and allosomes. Autosomes contain genes that determine the somatic (body) characters. Male and female have equal number of autosomes.

44. Which of these chromosomes is used to determine the sex of an individual?
a) Allosomes
b) Sex chromosomes
c) Hetero- chromosomes
d) All the above
Explanation
Allosomes are chromosomes which are responsible for determining the sex of an individual. They are also called as sex chromosomes or hetero-chromosomes. There are two types of sex chromosomes, X and Y- chromosomes. Human male have one X chromosome and one Y chromosome and human female have two X chromosomes.

45. Choose the correct statements.
i) The number of chromosomes in any living organism is not constant.
ii) In Human each cell contains 23 pair of chromosomes.
iii) Human has 22 pair of allosomes and 23rd pair is an autosome.
a) i only
b) ii only
c) iii only
d) None of the above
Explanation

The number of chromosomes in any living organism (animal or plant) is constant. In human, each cell normally contains 23 pairs of chromosomes. Out of which 22 pairs are autosomes and the 23rd pair is the allosomes or sex chromosome.

46. Assertion (A): The human body cells have pairs of chromosomes which are known as diploid condition.
Reasoning(R): The gametes are said to be haploid as it contains a single set of chromosomes.
a) Both A and R is True and R is the correct explanation of A.
b) Both A and R is True but R is not the correct explanation of A.
c) A is True but R is False.
d) Both A and R is False.
Explanation
In the body cells of sexually reproducing organisms, the chromosomes generally occur in pairs. This condition is called diploid (2n). The gametes produced by the organisms contain a single set of chromosomes. Hence the gametes are said to be haploid (n).

47. Which of these are known as the karyotype of the cell nucleus of an organism?
a) Number of chromosomes
b) Size of the chromosomes
c) Shape of the chromosomes
d) All the above
Explanation
Karyotype is the number, size and shape of chromosomes in the cell nucleus of an organism.

48. Choose the correct statements.
i) Idiogram is the diagrammatic representation of Karyotype of a species.
ii) Idiogram consists of all the metaphasic chromosomes arranged in heterogeneous pairs.
iii) The heterogeneous pairs are arranged in the decreasing length, thickness, position of centromere and shape.
iv) The sex chromosomes are placed at the end.
a) i, iv only
b) ii, iii, iv only
c) iii only
d) iii, iv only
Explanation
Idiogram is the diagrammatic representation of karyotype of a species. It consists of all the metaphasic chromosomes arranged in homologous pairs according to decreasing length, thickness, position of centromere, shape etc., with the sex chromosomes placed at the end.

49. Choose the correct statements.

i) DNA is the most important constituent of the chromosome as it contains the genetic information.
ii) The double helical structure of James Watson and Francis Crick is the most accepted structure of DNA.
iii) The 3-D model of DNA is based on the X-ray diffraction studies of DNA by Rosalind Franklin and Maurice Wilkins.
a) i only
b) ii only
c) iii only
d) All the above
Explanation
DNA is the hereditary material as it contains the genetic information. It is the most important constituent of a chromosome. The most widely accepted model of DNA is the double helical structure of James Watson and Francis Crick. They proposed the three-dimensional model of DNA on the basis of X-ray diffraction studies of DNA obtained by Rosalind Franklin and Maurice Wilkins.

50. In which year Watson, Crick and Wilkins were awarded the Nobel Prize for their discoveries?
a) 1943
b) 1978
c) 1962
d) 1954
Explanation
In appreciation of their discoveries on the molecular structure of nucleic acids Watson, Crick and Wilkins were awarded Nobel Prize for Medicine in 1962.

51. Which of the following is not a component of a polynucleotide or DNA?
a) Protein Molecules
b) Deoxyribose sugar
c) Nitrogenous base
d) Phosphate group
Explanation
Chemical Composition of DNA molecule DNA is a large molecule consisting of millions of nucleotides. Hence, it is also called a polynucleotide. Each nucleotide consists of three components. Sugar molecules – Deoxyribose sugar, a nitrogenous base and a phosphate group

52. Which of these are the types of nitrogenous bases of DNA?
a) Adenine
b) Guanine
c) Cytosine
d) All the above
Explanation

There are two types of nitrogenous bases in DNA. They are Purines (Adenine and Guanine) and Pyrimidines (Cytosine and Thymine)

53. By which of these the nucleotides are formed in a DNA?
a) Purines
b) Proteins
c) Pyrimidines
d) Both a and c
Explanation
Nucleoside and Nucleotide
Nucleoside = Nitrogen base + Sugar
Nucleotide = Nucleoside + Phosphate
The nucleotides are formed according to the purines and pyrimidines present in them.

54. Which of these are the features of Watson and Crick model of DNA?
a) Nitrogenous bases in the center are linked to sugar-phosphate units are the backbone of DNA.
b) DNA molecule consists of two polynucleotide chains forming a double helix structure with two strands run anti-parallel to one another.
c) The nucleotides in a helix are joined by phosphodiester bonds.
d) All the above
Explanation
Watson and Crick model of DNA: DNA molecule consists of two polynucleotide chains. These chains form a double helix structure with two strands which run anti-parallel to one another. Nitrogenous bases in the center are linked to sugar-phosphate units which form the backbone of the DNA. The nucleotides in a helix are joined together by phosphodiester bonds.

55. Choose the correct statements.
i) The Complimentary base pairing is done between the nitrogenous bases of DNA.
ii) Adenine is linked with Thymine with two hydrogen bonds (A=T).
iii) Three hydrogen bonds link the Cytosine and Guanine (C ≡ G).
a) i only
b) ii only
c) iii only
d) All the above
Explanation
Pairing between the nitrogenous bases is very specific and is always between purine and pyrimidine linked by hydrogen bonds. Adenine (A) links Thymine (T) with two hydrogen bonds (A = T). Cytosine (C) links Guanine (G) with three hydrogen bonds(C ≡ G). This is called complementary base pairing.

56. Which of these stabilizes the DNA molecules?
a) Hydrogen bonds
b) Chromosomes
c) Enzymes
d) All the above
Explanation
Hydrogen bonds between the nitrogenous bases make the DNA molecule stable.

57. How many base pairs are in a complete turn of a DNA?
a) 2
b) 4
c) 10
d) 22
Explanation
Each turn of the double helix is 34 A° (3.4 nm). There are ten base pairs in a complete turn.

58. Define the Chargaff rule of DNA base pairing.
a) The proportion of Adenine is always equal to Thymine.
b) The Proportion of Guanine is always equal to Cytosine.
c) The proportion of Adenine is less than Guanine.
d) Both a and b
Explanation
Chargaff rule of DNA base pairing: Erwin Chargaff states that in DNA, the proportion of adenine is always equal to that of thymine and the proportion of guanine always equal to that of cytosine.

59. Choose the Incorrect statements.
i) DNA molecule produces exact copies of its own structure during replication process.
ii) The nucleotides of each strand provide the information needed to produce a new strand.
iii) The two resulting daughter cells contain the contrast genetic information of the parent cell.
a) i only
b) ii only
c) iii only
d) None of the above
Explanation
DNA replication is one of the basic process that occurs within a cell. DNA molecule produces exact copies of its own structure during replication process. The two strands of a DNA molecule have complementary base pairs the nucleotides of each strand provide the information needed to produce its new strand. The two resulting daughter cells contain exactly the same genetic information as the parent cell.

60. Which of the following are true about the origin of replication?
i) Specific points on the DNA where the replication begins is the origin of replication.
ii) The two strands open and separate at the origin to form the replication fork.
a) i only
b) ii only
c) Both i and ii
d) Neither i nor ii
Explanation
Origin of replication: The specific points on the DNA where the replication begins, is the site of origin of replication. The two strands open and separate at this point form the replication fork.

61. What is the function of the enzyme Helicase?
a) Bind to the origin of replication site.
b) Synthesize the RNA primer.
c) Separates the double helix.
d) Forms the DNA templates.
Explanation
Unwinding of DNA molecule: The enzyme called helicase, bind to the origin of replication site. Helicase separates the two strands of the DNA.

62. Which of the following enzyme removes the twists formed by the unwinding process?
a) Primase
b) Helicase
c) Topoisomerase
d) Lipase
Explanation
The enzyme called topoisomerase separates the double helix above the replication fork and removes the twists formed during the unwinding process. Each of the separated DNA strands function as a template.

63. Which of these forms the RNA primer?
a) Short segment of RNA nucleotides.
b) DNA template
c) Complementary strand
d) Replication strand
Explanation
Formation of RNA primer: An RNA primer is a short segment of RNA nucleotides. The primer is synthesized by the DNA template close to the origin of replication site.

64. Choose the Incorrect statements.

i) The DNA polymerase adds the nucleotides to the RNA primer.
ii) A new complementary strand of DNA is formed from each of the parent strand.
iii) The synthesis of new complementary strand from the parent strand is bidirectional.
a) i only
b) ii only
c) iii only
d) None of the above
Explanation
Synthesis of new complementary strand from the parent strand: After the formation of RNA primer nucleotides are added with the help of an enzyme DNA polymerase and a new complementary strand of DNA is formed from each of the parent strand. The synthesis is unidirectional.

65. Assertion (A): The Leading strand is a continuously synthesized daughter strand.
Reasoning(R): The short segments of DNA are synthesized in the other strand known as lagging strand.
a) Both A and R is True and R is the correct explanation of A.
b) Both A and R is True but R is not the correct explanation of A.
c) A is True but R is False.
d) Both A and R is False.
Explanation
In one strand, the daughter strand is synthesized as a continuous strand which is called leading strand. In the other strand, short segments of DNA are synthesized. This strand is called lagging strand.

66. Which of this enzyme join the Okazaki fragments?
a) Polymerase
b) Ligase
c) Helicase
d) Primase
Explanation
The short segments of DNA are called Okazaki fragments. The fragments are joined together by the enzyme DNA ligase.

67. At which point the DNA replication stops?
a) Leading strand
b) Terminus
c) Short segments
d) DNA ligase
Explanation

The DNA replication stops when the replication fork of the two sides meet at a site called terminus, which is situated opposite to origin of replication site.

68. What are the significances of the DNA?
a) Responsible for the hereditary information transmission.
b) Information required for the protein formation.
c) Developmental process control and life activities of organisms.
d) All the above
Explanation
Significance of DNA: It is responsible for the transmission of hereditary information from one generation to next generation. It contains information required for the formation of proteins. It controls the developmental process and life activities of an organism.

69. What is known as sex determination?
a) Formation of zygote into male or female sex.
b) Sudden changes in the chromosomes.
c) Inheritance from the mother chromosomes.
d) All the above
Explanation
The formation of zygote into male or female sex during development is called sex determination. Sex is determined by the chromosomes of an individual.

70. How many pair of autosomes is present in the human beings?
a) 22
b) 23
c) 44
d) 20
Explanation
Recall that human beings have 23 pairs of chromosomes out of which 22 pairs are autosomes and one pair (23rd pair) is the sex chromosome.

71. The Female gametes or the eggs of the human beings are,
i) Homogametic
ii) Similar chromosome type
iii) Not responsible for the sex of the child.
a) i only
b) ii only
c) iii only
d) All the above
Explanation

The female gametes or the eggs formed are similar in their chromosome type (22+XX). Therefore, human females are homogametic.

72. Which of the following statement is not true regarding the male gametes?
a) The male gametes or sperm are of three types.
b) Human males are called as heterogametic.
c) Types of male gametes are produced in equal proportions.
d) The human male sperm bears 22+X and 22+Y chromosomes.
Explanation
The male gametes or sperms produced are of two types. They are produced in equal proportions. The sperm bearing (22+X) chromosomes and the sperm bear (22+Y) chromosomes. The human males are called heterogametic.

73. Choose the correct statements.
i) Both the male and female are the chances of probability of sperm fusing with the egg.
ii) The egg X is fused by the X-bearing sperm to produce the XX female.
iii) The Father and mother are both responsible in determining the sex of the child.
a) i only
b) ii only
c) iii only
d) None of the above
Explanation
Human male is a chance of probability as to which category of sperm fuses with the egg. If the egg (X) is fused by the X-bearing sperm an XX individual (female) is produced. If the egg (X) is fused by the Y-bearing sperm an XY individual (male) is produced. The sperm produced by the father, determines the sex of the child. The mother is not responsible in determining the sex of the child.

74. How many chromosomes are present in individual male?
a) 22-XY
b) 22+XX
c) 44+XY
d) 44-XY
Explanation
Fertilization of the egg (22+X) with a sperm (22+X) will produce a female child (44+XX). while fertilization of the egg (22+X) with a sperm (22+Y) will give rise to a male child (44+XY).

75. Mutation term was introduced by _____ when he observed phenotypic changes in the ____ plant.
a) Hugo de Vries, Evening Primrose
b) Carolus Linnaeus, Pea plant

c) Gregor Mendel, Oenothera lamarckiana
d) Watson, Hibiscus plant
Explanation
The term mutation was introduced by Hugo De Vries in 1901 when he observed phenotypic changes in the evening primrose plant, Oenothera lamarckiana.

76. Which of the following results in mutation?
a) Long lasting change in DNA.
b) Sudden inheritable change in DNA.
c) Slow non-heritable change in the DNA.
d) None of the above
Explanation
Mutation is an inheritable sudden change in the genetic material (DNA) of an organism.

77. How many types of mutations are classified?
a) 4
b) 5
c) 2
d) 3
Explanation
Mutations are classified into two main types, namely chromosomal mutation and gene mutation.

78. Which of these are caused by the chromosomal mutation?
a) Changes in the structure of the chromosomes
b) Changes in the behavior of the chromosomes
c) Changes in the number of chromosomes
d) Both a and c
Explanation
Chromosomal mutation: The sudden change in the structure or number of chromosomes is called chromosomal mutation. This may result in Changes in the structure of chromosomes and Changes in the number of chromosomes.

79. What are the structural changes occurring in the chromosomal mutation?
a) Deletion of chromosomes
b) Duplication of chromosomes
c) Inversion of chromosomes
d) All the above
Explanation

Structural changes in the chromosomes usually occur due to errors in cell division. The Changes in the number and arrangement of genes takes place as a result of deletion, duplication, inversion and translocation in chromosomes.

80. Define ploidy.
a) Translocation of chromosomes in a cell.
b) Changes in the number of chromosomes.
c) Addition or deletion in the number of chromosomes in a cell.
d) Both b and c
Explanation
Changes in the number of chromosomes: They involve addition or deletion in the number of chromosomes present in a cell. This is called ploidy.

81. How many types of ploidy are classified?
a) 4
b) 2
c) 5
d) 3
Explanation
There are two types of ploidy Euploidy and Aneuploidy.

82. What is the condition of Euploidy?
a) Less than or equal to the number of triploid chromosomes.
b) More than the usual number of diploid chromosomes.
c) Less than usual number of diploid chromosomes.
d) Nullisomy condition.
Explanation
Euploidy: It is the condition in which the individual bears more than the usual number of diploid (2n) chromosomes.

83. Assertion (A): Three haploid set of chromosomes result in the condition called as Triploidy.
Reasoning(R): The triploid plants and animals are typically sterile.
a) Both A and R is True and R is the correct explanation of A.
b) Both A and R is True but R is not the correct explanation of A.
c) A is True but R is False.
d) Both A and R is False.
Explanation
If an individual has three haploid sets of chromosomes, the condition is called triploidy (3n). Triploid plants and animals are typically sterile.

84. What is the advantage of the tetraploidy condition of plants?
a) Cross pollination
b) Increase in the number of seeds.
c) Increased Fruits and flower size.
d) High yield.
Explanation
If it has four haploid sets of chromosomes, the condition is called tetraploidy (4n). Tetraploid plants are advantageous as they often result in increased fruit and flower size.

85. Assertion (A): Aneuploidy is the loss organ of one or more chromosomes in a set.
Reasoning(R): Down's syndrome is one of the most commonly known aneuploid conditions in men.
a) Both A and R is True and R is the correct explanation of A.
b) Both A and R is True but R is not the correct explanation of A.
c) A is True but R is False.
d) Both A and R is False.
Explanation
Aneuploidy: It is the loss or gain of one or more chromosomes in a set. In man Down's syndrome is one of the commonly known aneuploid conditions.

86. Which of the following is not a type of Aneuploidy condition?
a) Nullisomy
b) Disomic
c) Trisomy
d) Monosomy
Explanation
The aneuploid conditions are of three types Monosomy (2n-1), Trisomy (2n+1) and Nullisomy (2n-2).

87. Who identified the Down's syndrome condition?
a) Louis Pasteur
b) Gregor Mendel
c) Langdon Down
d) James Watson
Explanation
Down's syndrome: This condition was first identified by a doctor named Langdon Down in1866.

88. State the condition for the Down's syndrome condition?
a) Trisomy 21
b) Trisomy 13
c) Trisomy 18

d) Trisomy 16

Explanation

Down's syndrome is a genetic condition in which there is an extra copy of chromosome 21 (Trisomy 21).

89. What are the conditions seen in the Down's syndrome children?

a) Delayed development

b) Weak muscle tone

c) Mental retardation

d) All the above

Explanation

Down's syndrome is associated with mental retardation, delayed development, behavioral problems, weak muscle tone, vision and hearing disability are some of the conditions seen in these children.

90. Choose the Incorrect statements about gene or point mutation.

i) Gene mutation is the change occurring in the nucleotide sequence of a gene.

ii) It involves insertion and deletion of single nitrogenous base.

iii) Gene alteration results in abnormal protein formation in an organism.

a) i only

b) ii only

c) iii only

d) None of the above

Explanation

Gene or point mutation: Gene mutation is the changes occurring in nucleotide sequence of a gene. It involves substitution, deletion, insertion or inversion of a single or more than one nitrogenous base. Gene alteration results in abnormal protein formation in an organism.

91. Which part of hemoglobin molecule is affected in the sickle cell anemia disease?

a) Nuclease

b) Protein

c) Cell wall

d) Cytoplasm

Explanation

Sickle cell anemia is caused by the mutation of a single gene. Alteration in the gene brings a change in the structure of the protein part of hemoglobin molecule. Due to the change in the protein molecule the red blood cell (RBC) that carries the hemoglobin is sickle shaped.

92. Assertion (A): Sickle cell anemia is caused by the mutation of a single gene.

Reasoning(R): The White Blood cell (WBC) is sickle shaped due to the protein change in the molecule.

a) Both A and R is True and R is the correct explanation of A.

b) Both A and R is True but R is not the correct explanation of A.

c) A is True but R is False.

d) Both A and R is False.

Explanation

Sickle cell anemia is caused by the mutation of a single gene. Due to the change in the protein molecule the red blood cell (RBC) that carries the hemoglobin is sickle shaped.