

Class 10 Heredity and Evolution CBSE Solved Test paper-1

Q.1.What is heredity?

Ans : Heredity refers to the transmission of characters or traits from the parents to their offspring.

Q.2. Name the plant on which Mendel performed his experiments?

Ans:- Garden Pea (*Pisum sativum*.)

Q.3. Define variation?

Ans :Variation refers to the differences in the characters or traits about the individuals of a species.

Q.4. Define a gene?

Ans: Gene is a small segment of DNA on a chromosome occupying specific position in which is a hereditary determinant or unit of a biological function.

Q.5. Write the expanded form of DNA?

Ans: DNA - Deoxyribonucleic Acid.

Q.6. what are the components of chromosome?

Ans: Each chromosome is double or replicated and consists of two threads like structures called chromatids attached to each other at centromere.

.Each chromatid has a number of dense areas arranged linearly which are known as chromomeres. They represent the areas of active genes.

.Internally each chromosome has two spirally coiled threads called chromonemata embedded in matrix. These are DNA molecules.

Q.7. What is a retrovirus?

Ans : A virus having RNA (Ribonucleic acid) as genetic (heredity) material is called Retrovirus. For example, Human immunodeficiency virus (HIV) is a retrovirus.

Q.8. What is sex chromosome?

Ans : A chromosome which is associated with sex determination is called sex chromosome.

Q.9. How is sex determined in human beings?

Ans :Sex is determined at the time of fertilization and the two sexes are produced in approximately equal numbers. A human male has XY sex-chromosomes and produces two types of sperms (heterogametic). Either with X-chromosome or with Y-chromosome.

A human female has XX sex-chromosomes and produce ova of one type (homogametic) all with X-chromosomes.

Parents	Male	Female
Gametes	X Y	X
Progeny	XX	XY
	Female (50%)	Male (50%)

Q.10. What do you understand by evolution?

Ans :Evolution is the sequence of gradual changes which takes place in the primitive organisms over million of years in which new species are produced.

Q.11. Define homologous organs?

Ans : Homologous organs are those organs which have the same basic structure and developmental origin but have different functions and appearance. e.g., the forelimb of a frog, a bird and a man seem to be built from the same basic design of bones, but they perform different functions.

Q.12. Explain Darwin's theory of evolution?

Ans :According to Darwin's theory of evolution:

(i) There is natural variation within any population and some individuals have more favourable variations than others..

- (ii) Population remains fairly constant even though all species produce a large number of off springs.
- (iii) This is due to 'competition' or struggle for existence between same and different species.
- (iv) The struggle for survival within population eliminates the unfit individuals and those with 'favourable variations' survive and pass on these variations to their progeny to continue. This is called natural selection.
- (v) The favourable variations are accumulated over a long time period leading to the origin of a new species.

Q13. Define genetics. What is the contribution of Mendel in this branch of biology?

Ans :Genetics is the branch of biology which deals with the study of heredity and variation.

Contribution of Mendel : Mendel done his experiments on garden pea(*pisum sativum*) and discovered the scientific principles which govern patterns of inheritance i.e. the principle of inheritance. He explained the contrasting characters are controlled by *units* which he called *Factors*. Today these factors are called genes.

Q14. Where are the genes located? What is the chemical nature of gene?

Ans : Genes are located on chromosomes. Chemically, genes are made of DNA(deoxy ribonucleic acid).

Q15. During which stage of cell division can chromosome be seen? Write the features of prokaryotic and eukaryotic chromosome.

Ans : Chromosomes can be seen during the *metaphase* stage of the cell division.

FEATURES OF *PROKARYOTIC CHROMOSOME*:

Prokaryotes (bacteria) have a single chromosome. The chromosome is circular and made up of a DNA molecule associated with a few proteins.

EUKARYOTIC CHROMOSOME:

Eukaryotes contain many chromosomes. Each is made up of a DNA molecule and *more number of basic proteins*. The chromosomes are *not circular but rod shaped*.

Q 16. Who provided the evidence of DNA as a genetic material? Write the names of components of DNA?

Ans :Griffith, Avery , McLeod and McCarty established that DNA is the genetic material.

Components of DNA : A DNA molecule consists of two polynucleotide chains. Each nucleotide consists of (a) nitrogenous base (Adenine/guanine/Thymine or Cytosine) ,a pentose sugar(deoxyribose) and a phosphate group.

Q17 .What do you understand by the double helical structure of DNA? Who proposed this structure?

Ans : J.D.Watson & F.H.C.Crick proposed the double helical structure of DNA.

The important features of the model are:

(i) DNA molecule consists of two polynucleotide strands forming a double helix.

Each helical turn has a length of 3.4nm in which ten nucleotides present.

(ii) Each polynucleotide stand has a backbone of sugar and phosphate. The nitrogenous base is attached to the sugar.

(iii) The nitrogenous bases of the two stands of a double helix form a pair with the help of hydrogen bonds. Adenine pairs with Thymine , whereas the guanine pairs with Cytosine. Such a specific pairing of the bases is called complimentarypairing.

A and T are complimentary to each other and G is complimentary to C. The hydrogen bonding between the nitrogenous bases holds the two strands together as a result of which the base pairs remains stacked between the two strands.

This structure can be compared with the steps of a spiral staircase.

Q18.Describe the different types of chromosomes.

Ans:- depending on the position of the centromere,a chromosome may have either equal arms, or one long and one short arm. Accordingly, four types of chromosomes are known :

Metacentric:It is a chromosome with the centromere near the middle and the two arms are almost equal in length.

Sub-metacentric: In this type of chromosome the centromere is situated closer to one end. As a result, one arm of the chromosome is long and one is slightly short.

Acrocentric: It is the type of the chromosome which has the centromere near the end. In this case one arm is very long and the other one is very short.

Telocentric: In this type of the chromosome, the Centromere is situated at the tip of the chromosome.

Q19. How many types of nitrogenous bases are present in DNA? Name them.

Ans:- In DNA two types of nitrogenous bases are present. These are (i) PURINES which are adenine and guanine (ii) PYRIMIDINES which are Thymine and cytosine.

Q.20. How do embryological studies provide evidence for evolution?

Ans:- The similarities in embryonic development reinforce the idea of evolution from common ancestors. The sequence of embryonic development in different vertebrates shows striking similarities. Notochord and gill clefts appear in the embryos of all vertebrates.

Q.21. Define evolution. And Describe the contribution of Lamarck?

Ans:- Evolution is the sequence of gradual changes which takes place in the primitive organisms over millions of years in which new species are produced.

Contribution of Lamarck:

(i) Lamarck proposed a theory called "The Theory of inheritance of Acquired Characters" to explain the origin and evolution of species.

(ii) The theory was explained in his book 'Philosophic Zoologique'.

Q.22. What are homologous organs? How do they provide evidence in support of evolution?

Ans:- Homologous organs are those organs which have the same basic structure and developmental origin but have different functions and appearance.

Homologous organs support evolution:

(i) The similarities of structure and origin of organs indicate that all vertebrates had common ancestors. For example, the forelimbs of humans, whale and bat show structural similarities but

functional dissimilarities. Forelimbs in humans used for grasping or holding the things, in whale for swimming and in bat for flying.

(ii) All the organs and systems of the vertebrates show fundamental similarities i.e. homology, which indicate towards common ancestry. Thus, homologous point that organic evolution has taken place.

Q.23. Define the following terms?

Ans:- (i) Vestigial organs: Vestigial organs are those organs, which are rudimentary and functionless in the evolved forms but are well developed and functional in the ancestral forms.

Eg: Vermiform appendix in human beings.

(ii) Analogous organs : Are those organs which have different basic structure and developmental origin but have similar appearance and perform similar functions. Eg: The wings of an insect and a bird have different structures, but they perform the same function of flying.

Q.24. 1. What are transgenic organisms? Which property of DNA is used as a tool in genetic engineering?

Ans:-The organisms that contain a segment of foreign DNA are known as transgenic organisms. The complementary property of the nucleotides of DNA is the most powerful tool in genetic engineering.

Q.25. Explain how the sex of the child is determined at the time of conception in human beings.

Ans:- Male human beings have XY sex-chromosomes and female human beings have XX sex-chromosomes. If a sperm carrying x-chromosome fertilizes with the ovum, then sex of the baby will be female. If a sperm carrying y-chromosome fuses with the ovum, the sex of the baby will be male.