Important Questions for Class 10
Science
Chapter 8 – Heredity and Evolution

Very Short Answer Questions **1 Mark**

1. Select the group which shares maximum number of common characters-
(a) two genera of two families
(b) two species of a genus
(c) two genera of a family
(d) two individuals of a species
Ans: (d) two individuals of a species

2. Two pea plants one with round green seeds (RRyy) and another with wrinkled yellow (rrYY) seeds produce F_1 progeny having round, yellow (RrYy) seeds. When F_1 plants are selfed, the F_2 progeny will have the following combination of characters
(a) 15:1
(b) 9:3:3:1
(c) 9:3:4
(d) 12:3:1
Ans: (b) 9:3:3:1

3. Some dinosaurs had feathers although they could not fly but birds have feathers that help them to fly. In the context of evolution this means that-
(a) reptiles have evolved from birds
(b) there is no evolutionary connection between reptiles and birds
(c) feathers are homologous structure in both the organisms
(d) Birds have evolved from reptiles.
Ans: (d) Birds have evolved from reptiles.

4. What is monohybrid cross?
Ans: The combination between two plants that display two different variants of a property (character).

5. What are autosomes and sex chromosomes?
Ans: There are 23 pairs of chromosomes in a human cell. 22 pairs are termed autosomes, while the remaining 1 pair, which determines a child's sex, is called sex chromosome.

6. Which of the following scientist gave the principles of inheritance?
(a) Mendel
(b) Griffin
(c) Johanssen
(d) Watson and Crick
Ans: (a) Mendel

7. Which of the following is not correct-
(a) For every hormone there is a gene.
(b) For every protein there is a gene.
(c) For production of every enzyme there is a gene.
(d) For every molecule of fat there is a gene.
Ans: (a) For every protein there is a gene.

8. According to the evolutionary theory formation of a new species occurs generally due to-
(a) Sudden creation by nature.
(b) accumulation of variations over several generations
(c) clones formed during asexual reproduction
(d) Movement of individuals from one habitat to another.
Ans: (a) accumulation of variations over several generations.

9. Who coined the term 'gene'?
Ans: The term gene was originated by Johannsen (1909).

10. What are dominant genes?
Ans: A dominant gene is one which expresses itself.

11. The concept of origin of species by natural selection was given by.
(a) Lamarck
(b) Weismann
(c) Darwin
(d) Linnaeus
Ans: (c) Darwin

12. It a round green seeded pea plant (RRYY) is crossed with wrinkled yellow seeded pea plant (rr yy) the seeds to be produced in F_1 generation will be.
(a) Wrinkled and yellow
(b) round and green
(c) wrinkled and green
(d) round and yellow.

Ans: (b) round and green

13. The genetic constitution of an organism is called.
(a) Genotype
(b) phenotype
(c) variation
(d) gene.
Ans: (a) Genotype

14. Write the scientific name of the plant on which Mendel carried out his experiments.
Ans: Pisum sativum

15. How many autosomes are present in human sperm?
Ans: 22

16. Two pink coloured flowers on crossing results in 1red, 2pink and 1white flower progeny. The nature of the cross is-
(a) cross fertilization
(b) self pollination
(c) double fertilization
(d) no fertilization
Ans: (d) cross fertilization

17. A basket of vegetable contains carrot, potato, radish, and tomato. Which of them represent the correct homologous structure
(a) carrot and potato
(b) carrot and tomato
(c) radish and carrot
(d) radish and potato
Ans: (c) radish and carrot

18. Mendel proposed that every character is controlled by-
(a) one factor
(b) two factors
(c) one chromosome
(d) two chromosomes
Ans: (b) two factors

19. Who is called father of genetics?

Ans: Gregor Mendel.

20. What is the scientific name of human being?
Ans: Homo sapiens

21. The theory of chemical evolution of life was experimentally demonstrated by-
(a) Oparin
(b) Miller and Urey
(c) Mendel
(d) Darwin
Ans: (b) Miller and Urey

22. Genetics is the study of-
(a) resemblances amongst individuals
(b) heredity and environment
(c) differences amongst individuals
(d) Heredity and variations.
Ans: (d) Heredity and variations.

23. Wing of a bird and wing of an insect are
(a) Homologous organs
(b) analogous organs
(c) vestigial organ
(d) both (a) and (b)
Ans: (a) Homologous organs

24. What is heredity?
Ans: Heredity refers to the transmission of a person's personality from one generation to the next.

25. What are Mendelian factors?
Ans: Mendelian factors are heredity components that carry on character from parents to offspring.

26. A Mendelian experiment consisted of breeding tall pea plants bearing violet flowers with short pea plants bearing white flowers. The progeny all bore violet flowers but almost half of them were short. This suggests that the genetic make-up of the tall parent can be depicted as
(a) TTWW
(b) TTww

(c) TtWW
(d) TtWw
Ans: (c) TtWW

27. An example of homologous organs is
(a) Our arm and a dog's fore-leg.
(b) Our teeth and an elephant's tusks.
(c) Potato and runners of grass.
(d) All of the above.
Ans: (d) All of the above**.**

28. In evolutionary terms, we have more in common with
(a) A Chinese school-boy.
(b) A chimpanzee
(c) A spider
(d) A bacterium
Ans: (a) A Chinese school-boy.

29. What happened when Mendel crossed two traits of a character in a pea plants?
Ans: In F, there was only one dominant characteristic.

30. Who provided experimental evidence to support theory of origin of life from inanimate matter?
Ans: Miller and Urey

31. A normal pea plant bearing coloured flowers suddenly start producing white flowers. What could be the possible cause?
Ans: Mutation is responsible for the appearance of white flowers.

32. Mention any two recessive traits of garden pea.
Ans: Dwarf (height of plant) and wrinkled seed.

33. What is called phylogenetic system of classification?
Ans: Organisms are classified depending on their evolutionary relations.

34. What will be the percentage of ab gametes produced by AaBb parent?
Ans: 25 percent

35. Mendel crossed a pure white recessive pea plant with a dominant pure red flowered plant. What will be the first-generation f hybrids.?

Ans: Allred

36. Name the chemicals which were essential for origin of life.
Ans: Proteins and nucleic acid

37. Why males are called heterogametic?
Ans: Because their y chromosomes are different.

38. What is the percentage possibility a couple of having daughters?
Ans: 50 percent

39. Name 2 organisms in which sex determination is regulated by environmental factors.
Ans: Turtle and lizard.

40. Clones of sheep are carbon copy of each other except physical health. What kind of variation, is it?
Ans: Phenotypic variation

Short Answer Questions **2 Marks**

1. Why acquired traits are not inherited?
Ans: Acquired traits are those that organisms develop over the course of their lives. These characteristics can't be handed down because they're caused by non-reproductive tissue.

2. How evolution and classification are linked?
Ans: The organisation of organisms into groups based on their properties is known as classification. Characteristics are physical or behavioural characteristics. The most advanced and effective classification system is based on evolution. The division of organisms/species into groups reflects their shared origins, as well as their evolutionary relationship.

3. What are coacervates?
Ans: Coacervates are the first life molecules created when a membrane forms around amino acids, sugars, and nitrogenous bases aggregates. Coacervates continue to evolve, eventually leading to the origin of life.

4. How do the two factors for a character, present in diploid cells, behave at the time gamete formation?

Ans: During gamete development, two components named X and Y separate. As a result, the gamete is either X or Y.

5. Give the pair of contrasting traits of the following characters in plant and mention which one is recessive and which is dominant?

(a) yellow seed

Ans: Green seed- Dominant
Yellow seed- Recessive

(b) round seed

Ans: Wrinkled seed – Recessive
Round seed- Dominant

6. Mention two important features of fossils which help in evolution.

Ans:

(a) Fossils are solid proof of evolution.
(b) Fossil records can help fill in the gaps between two groups of organisms, such as Archaeopteryx.

7. What do you understand by the term natural selection?

Ans: Natural selection theory states that nature selects the fittest animals for breeding, while those who do not fit are removed by nature.

8. Mention the compliment of a sperm and the egg which will determine the birth of female child.

Ans: The X chromosome is found in both the sperm and the egg of a female kid.

9. What is emasculation? Why is it done?

Ans: Emasculation is the removal of an anther to prevent pollination in an experimental plant.

10. What is gene? Where are genes located?

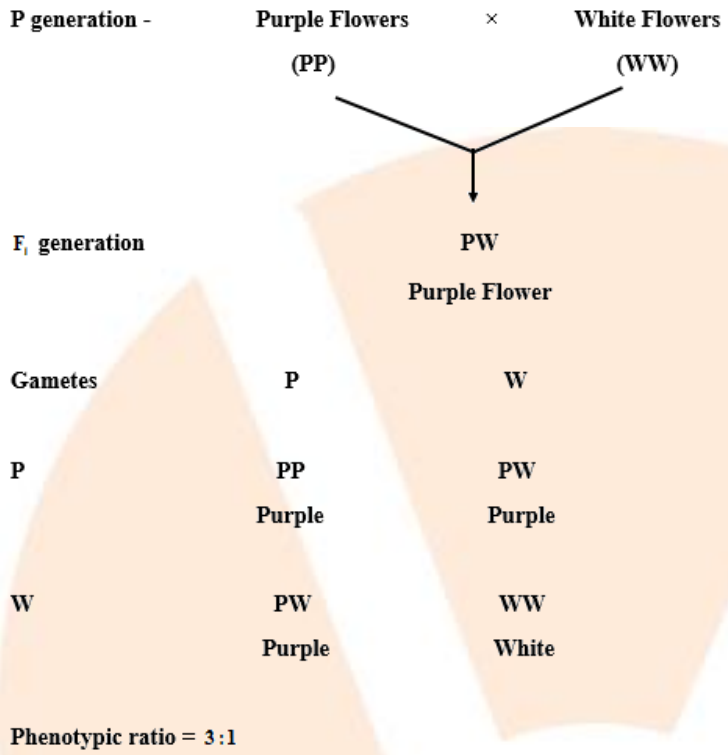
Ans: The term "gene" refers to DNA segments.
Chromosomes are where genes are found.

11. How many contrasting characters did Mendel see in garden pea? Give any two of them.

Ans: In the pea plant, Mendel discovered seven distinct characteristics.
For example, axial and terminal flower positions. Round and wrinkled seed form.

12. What is phenotypic ratio obtained by Mendel by monohybrid clots? Answer with the help of diagram.

Ans:



13. Why acquired characters are not inherited?

Ans: Acquired qualities are those that organisms develop over the course of their lives.

They are not passed down to future generations. Because these characteristics are caused by non-reproductive tissues, they cannot be handed forward.

14. How is the chromosome number restored in zygote?

Ans: Male and female gametes each have N chromosomes. Gametes combine and form a zygote during fertilisation. The number of chromosomes in a zygote is 2N.

15. What are variations? Give their types.

Ans: Despite the fact that offspring of the same parents seem same, they are not identical to their parents. There are three distinctions between them. Variations are the term for these disparities. There are two types of it:

(a) Reproductive- It is passed down from one generation to the next.

(b) Non-reproductive—not passed down from generation to generation.

16. Write difference between Autosomes and Allosomes.

Ans: The difference between autosomes and allosomes is as given below,

Autosomes	Allosomes (Sex Chromosomes)
Chromosomes that are not really involved in determining sex.	Chromosomes that have a part in defining a person's gender.
Males and females have similar traits.	Males (XY) and females (XY) were dissimilar.
In humans, there are usually 44 or 22 pairs.	In humans, there are usually two or one pair.

17. What will be the sex of the embryo if an egg is fertilized by the sperm having?

(a) 22 + x and

Ans: Female

(b) 22 + y composition

Ans: Male.

18. Mention two sources of variation.

Ans:

(1) DNA copying errors.

(2) Fertilization at random.

19. What is monohybrid and dihybrid cross? Give one example of each.

Ans: Monohybrid cross- This is the simplest cross in which only one character's inheritance is investigated. A cross is created by crossing two plants with one contrasting characteristic, such as tall or dwarf.

Dihybrid cross- A dihybrid cross is a cross between two plants with two sets of opposing characters. Round and green seed, for example, crossed with yellow and wrinkled seed.

20. Why did Mendel choose pea plant for his experimentation?

Ans: Mendel chose the garden pea for his experiment for the following reasons:

(a) Because this plant has a short life cycle, the results may be gathered and evaluated more quickly.

(b) The garden pea possesses a number of features that are diametrically opposed to one another.

(c) This plant is also tiny, easy to grow, and produces a big number of offspring.

21. If a trait A exists in 10% of a population of an asexually reproducing species and a trait B exists in 60% of the same population, which trait is likely to have arisen earlier?

Ans: Trait B.

22. What are the different ways in which individuals with a particular trait may increase in a population?

Ans: Individuals with a certain attribute can increase in a variety of ways, including:

(a) Natural selection- Certain differences give individuals in a group a survival edge in a changing context, resulting in population growth.

(b) Genetic drift—In a small population, even if no survival benefit is gained, accidents can lead to an increase in the number of specific individuals.

23. Why are traits acquired during the life-time of an individual not inherited?

Ans: Any changes in non-reproductive organs are not passed on to germ cell DNA. As a result, qualities acquired during a person's lifetime are not inherited.

24. Why are the small numbers of surviving tigers a cause of worry from the point of view of genetics?

Ans: It will have an impact on the frequency of selection, which is necessary for survival. The population must have an indefinitely vast number of individuals in order for selection to be effective.

25. Give an example of characteristics being used to determine how close two species are in evolutionary terms.

Ans: We can infer how far evolutionary links go by looking at the organ structure in fossils. The presence of feathers in some dinosaur remains, for example, suggests that birds are closely linked to reptiles.

26. Can the wing of a butterfly and the wing of the bat be considered homologous organs?

Ans: No, while the function of the wing is the identical in both cases, the structural plan and origin are not.

27. Why are human beings who look so different from each other in terms of size, colour and looks said to belong to the same species?

Ans: Humans differ from one another in terms of size and colour, but they are all members of the same species. This is due to the fact that, despite the tremendous diversity of human shapes and traits among different human races around the world, all human beings' genetic footprints can be traced back to the same common heritage of African origins. Humans are a single species that descended from the earliest

members of the human species in Africa, Homo sapiens. Because there has been no well-defined geographical or reproductive isolation among members of the human species, this has resulted in a wide range of genetic makeups for features with minor differences.

28. In evolutionary terms, can we say which among bacteria, spiders, fish and chimpanzees have a 'better' body design? Why or why not?

Ans: We can't say whether of germs, spiders, fish, or chimps has a "superior" body design in evolutionary terms. The idea that various animals have better bodily designs is unjustifiable. Because the evolutionary process considers the development of the most efficient and suitable elements in organisms' body designs for survival and adaption to a specific niche. Organisms with a complex and ostensibly better body architecture, for example, may not be able to live in a given context. Bacteria, on the other hand, can survive in the most hostile and severe environmental circumstances, such as extremely hot, cold, or acidic, due to their rudimentary body design and simple microbial life style. Bacterial microorganisms can be found deep beneath arctic ice, in deserts, near volcanic eruptions on the surface of the world, at thermal vents under the deep sea or on the surface of the globe, and even in outer space.

29. How are the areas of study- evolution and classification interlinked?

Ans: When we classify organisms, we look for similarities that allow us to group them together. We can deduce the evolutionary link between the species using these ideas.

30. Explain the importance of fossils in deciding evolutionary relationship.

Ans:

(i) The study of fossils allows us to estimate how far back creatures' evolutionary relationships go.

(ii) Knowing the age of fossils allows us to determine which organisms evolved first and which evolved later.

31. Write the characteristics on the basis of which duck-biled platypus is considered as a link between reptiles and mammals.

Ans: Laying of eggs is a feature that resembles reptiles, whereas the presence of mammary glands is a characteristic that resembles mammals.

32. Why are the small number of surviving tigers a cause of worry from the point of view of genetics?

Ans: As the tiger population declines, genes are lost from the gene pool, which means there can be no recombination's or variants, and hence no evolution.

33. How one is change adopted to perform different functions? Give one example

Ans: One modification that occurred early in evolution is now utilised to accomplish additional functions. Feathers, for example, evolved for warmth before being modified for flying.

34. Why are asexually reproducing organisms capable of showing hereditary features?

Ans: Asexual reproduction tends to preserve the genetic similarities among all members of a line of descent. As a result, asexually reproducing organisms can exhibit hereditary characteristics.

35. If the sperm bearing Y-chromosome fertilizes the egg, the child born will not be entirely like his father. Why is it so?

Ans: This is because the X-chromosome, the other sex chromosome, will also have an impact. Other egg autosomes will also display their properties.

36. In evolutionary terms, which among-bacteria, spider, fish and chimpanzee have a "body design? Why or why not?

Ans: Chimpanzees have a better bodily design than the other species. They have greater movement, communication, and reasoning abilities.

37. What is an offspring?

Ans: Offspring are organisms that are raised as a result of gene segment crossing and exchange in sexual reproduction.

38. What are inherited traits? Give one example.

Ans: Inherited traits are characteristics that are passed on from parents to their children. For example, earlobes that are both free and attached.

39. When Mendel crossed a tall plant with a dwarf plant, no medium height plants were obtained in F generation. Why?

Ans: Because dominant genes express themselves and prevent recessive genes from having an influence. As a result, no plants of medium size were obtained.

40. The human hand, cat paw and horse foot when studied in detail show the same structure of bones and point towards a common origin.

i. What do you conclude from this?

Ans: We can deduce that these organs share a common ancestor.

ii. What is the term given to such structures?

Ans: Homologous organs are those that are identical to one another.

41. How do we know how old a fossil is?
Ans: There are two techniques:
(i) Relative method: When we delve into the earth, we find that the fossils found closer to the surface are more recent than those found in deeper levels.
(ii) In the fossil material, by measuring the ratios of different isotopes of the same element.

42. What will be the sex of a baby if sperm carrying X chromosome fertilizes egg in human beings? Why?
Ans: It will be a female since the fusing of gametes containing X chromosomes produces a homozygous zygote with the XX composition.

43. Feather imprints were preserved along the dinosaur's bones but dinosaurs could not fly. What was the significance of feathers in reptiles and later on for other species?
Ans: Dinosaur feathers are thought to have offered protection in cold temperatures, but they eventually became beneficial for avian flight.

44. What will be the blood groups of offspring produced by the parents having following genotype?
Male -II
Female 1
Ans:

$\downarrow GAMETES \rightarrow$	I^0	I^A
I^A	I^AI^0 (i)	I^AI^A (ii)
I^BI	I^BI^0 (iii)	I^AI^B (iv)

Blood groups will be:
(i) A
(ii) A
(iii) B
(iv) AB

45. A woman with blonde curly hair married a man with black soft hair. All of their children in first generation had black soft hair but in next generation children had different combinations in the ratio of 9:3:3:1. State the law that governs this Expression

Ans: The law of independent assortment holds that the factors of various pairs of opposing traits are unaffected by one another. In terms of selection, they are unrelated to one another.

Short Answer Questions **3 Marks**

1. Only variations that confer an advantage to an individual organism will survive in a population. Do you agree with this statement? Why or why not?

Ans: Variations that benefit an individual organism may or may not survive in the population, depending on the organism's social behaviour. A variant in a sociable species, such as an ant, may not survive in a population, whereas a variation in a predatory animal, such as a leopard, may.

2. What are the different approaches to determine evolutionary history of man?

Ans: There are three methods for reconstructing man's evolutionary history:

(1) Fossil records provide direct evidence in the form of the historical approach. Carbon dating techniques can be used to establish the age of fossils.

(2) Comparative method- By comparing multiple existing forms, we can build hypotheses about their common ancestors and reconstruct their history.

(3) Analytic method: Observing vestigial organs in modern humans and examining their development from embryo to adult.

3. What is fossilization? How are fossils formed?

Ans: Fossilization is the term for the process of forming fossils. When organisms die, their corpses disintegrate and become fossilised. The body, or a portion of it, may be in an environment that prevents it from fully decomposing. The mud will solidify over time and maintain the impression of the organism's bodily parts. This mud with the imprint will be referred to as an organism's fossil.

4. What are homologous and analogous organ? Explain with the help of example.

Ans: Homologous organs have a similar basic structure and origin, but may perform diverse tasks. Human hands, for example, and avian wings, for example.

Organs that have a similar function but a different basic structure and origin are referred to as comparable organs.

For example,

(1) a bat's wing and a bird's wing.

(2) a bird's wing and an insect's wing

5. Differentiate between convergent and divergent evolution.

Ans: The difference between convergent and divergent evolution is as given below,

Convergent Evolution	Divergent Evolution
Adapted to perform a specific purpose.	Adapted for a variety of purposes.
Organ with a similar function.	Homologous organ is a term used to describe an organ that is identical to another.
Do not provide any details on the evolutionary relationship.	Show the evolution of an organism.

6. What are the different ways in which individuals with a particular trait may increase in a population?

Ans: Selection of environmental conditions for a species' survival are the factors that are responsible for raising a new species. If a variation exists in a population and the variation results in the organism surviving better in the prevailing natural conditions, the characteristic will be naturally selected and spread across the population.

7. What are the different theories about origin of life?

Ans:

(a) Special creation theory: This theory claims that the almighty god created life.
(b) Idea of spontaneous generation- According to this theory, life sprang from non-living components by a biogenesis process including mud, decaying matter, the sun, air, and water, among other things.
(c) Cosmozoic theory: According to this view, life came to Earth in the form of spores or seeds from distant celestial bodies.
(d) Biogenesis—According to this hypothesis, life evolved from pre-existing life.
(e) The modern view of life's genesis states that complex organic molecules can only be generated from simple inorganic molecules under certain conditions.

8. What is the difference between chemical evolution and organic evolution?

Ans: The difference between chemical and organic evolution is as given below,

Chemical Evolution	Organic Evolution
It is the transformation of a simple organic compound into a complex organic compound.	It is the technique by which a complex form of life arises from a simple form of life.
It happened at the beginning of life.	It is still carrying on.

Irreversible.	Reversible.
The rate of evolution is fast.	The rate of evolution is slow.

9. Give difference between homologous and analogous organs.

Ans: The difference between homologous and analogous organs is as given below,

Homologous organs	Analogous organs
Although they are similar in origin and basic structure, their functions may differ.	Although they are dissimilar in origin and basic structure, they may serve the same purpose.
Give a sense of shared ancestry.	Don't give the impression of shared ancestry.
For example, the human hands and the horse's forelimbs	For example, birds' and insects' wings

10. State three laws of Mendel.

Ans:

Mendel's law-

(a) Law of dominance- When two distinct character factors are present in an organism, only one (dominant factor) manifests itself, while the other (recessive factor) remains unexpressed.

(b) Principle of segregation –At the moment of gamete formation, two elements of a character are separated, and each gamete receives only one factor for that character.

(c) Principle of independent assortment-This concept asserts that one pair of contrasting qualities is independent of the other pair of contrasting traits when two or more pairs of contrasting traits are inherited.

11. Describe how the sex of the offspring is determined in the zygote ins human beings?

Ans: Males have the ability to create either X-type or Y-type gametes. The females only generate the X-type of gametes or ova. If X-type sperm unites with the ovum, the infant will have a feminine sex. If Y-type sperm is used in conjunction with the ovum, the kid will be male. The baby's gender is determined at the time of conception. The baby's sex is determined at the time of conception.

12. Give a suitable explanation for "geographical isolation of individual of a species lead to formation of a new species?

Ans: Between the subpopulations, a reproduction barrier such as a river (geographical isolation) leads to:

(a) Genetic drift, or chance changes in gene frequency, such as the selection of red or blue beetles over green beetles in the presence of crows.

(b) Natural selection, or selection of the fittest by nature, e.g., in the presence of crows, green beetles are preferred over red beetles.

13. State the evolutionary force which leads to origin of a new species.

Ans: The following are some of the evolution's elemental forces:

(a) Mutation

(b) Recombination (crossing over during meiosis, random gene assortment during gamete production)

(c) Survival of the fittest or natural selection

(d) Genetic drift is a term used to describe the process of a person's

14. What is a fossil? How do fossils tell us about the process of evolution?

Ans: Fossils are the dead remains of former live species. Palaeontology is the branch of biology concerned with the study of fossils. The study of fossils reveals that species evolved from pre-existing ones or that evolution has occurred and is still occurring in nature.

15. Give difference between diploid and haploid.

Ans: The difference between diploid and haploid is as given below,

Diploid	Haploid
Set of two chromosomes.	Set of one chromosome.
The chromosomes are arranged in pairs.	Single chromosomes are found.
Made as a result of mitosis.	Made as a result of meiosis.
Humans and higher plants contain it.	Lower plants contain it.

16. Who disproved Lamarckism and how?

Ans: August Weismann established that Lamark's acquired character could not be inherited. He began cutting the rat's tail at birth and proceeded for 21 generations. Tight-lipped rats, on the other hand, were never born. Because this feature does not alter the DNA of germ cells, it cannot be passed down the generations. As a result,

alterations in an individual's non-reproductive tissue during their lifespan cannot be passed on to their progeny, and hence cannot direct evolution.

17. How does Archaeopteryx provide evidence for organic evolution?

Ans: Archeopteryx contains reptile-like characteristics, dinosaur-like characteristics, and bird-like characteristics such as wings. This demonstrates that birds and reptiles are closely linked. Reptiles may have evolved into birds.

18. What is divergent evolution? Explain with the help of an example.

Ans: Divergent evolution is the process of animals with distinct appearances evolving from common ancestors. This is also known as adaptive radiation, and it refers to the evolution of new forms in multiple directions from a common ancestor type. The evolution of wild cabbage is a current example of such a process. For more than 200 years, humans have cultivated wild cabbage as a food plant and used artificial selection to produce a variety of vegetables (such as cabbage, broccoli, cauliflower, kohlrabi, and kale). As a result, all of these distinct vegetable structures are descended from the same ancestor, which is wild cabbage.

19. What is the difference between reproductive and non-reproductive variations?

Ans: The difference between non-reproductive and reproductive variation is as given below,

Non-Reproductive Variation	Reproductive Variation
In somatic cells, there is a lot of variation.	In germ cells, there is a lot of variation.
They are not passed down from generation to generation since they do not alter the DNA of germ cells.	They are passed down from generation to generation because they alter the DNA of germ cells.
Die along with the organism's death.	Do not perish along with the organism.
It is impossible to control evolution.	Can control the course of evolution.

20. Write similarities between Mendelian's factors and gene.

Ans: Mendel suggested that features are passed down from parents to children through hereditary units known as factors. Every character, according to Mendel, is influenced by a couple of factors.
Sutton and Boveri (1902) discovered strong parallels between Mendelian factors and chromosomal behaviour during meiosis and fertilisation. Factors and chromosomes are coupled in the parents, but they separate during meiosis and recombine after fertilisation.

21. How does the creation of variations in a species promote survival?
Ans: Different individuals would have different sorts of advantages to adjust in a certain ecosystem depending on the nature of the variances. Variation allows individuals to create a variety of features that make creatures more bearable.

22. How do Mendel's experiments show that traits may be dominant or recessive?
Ans: In a Mendel monohybrid cross between tall and dwarf pea plants, all progeny in the F_1 generation is tall, while 75 percent of pea plants in the F_2 generation are tall but 25% are dwarf. This demonstrates whether a characteristic is dominant or recessive.

23. How do Mendel's experiments show that traits are inherited independently?
Ans: When a round green seeded pea plant is crossed with a wrinkled yellow seeded pea plant in the F_1 generation, all of the plants have round yellow seeds. However, two new features, round yellow and wrinkled green, develop in the F_2 generation. This demonstrates that qualities are inherited separately.

24. A man with blood group A marries a woman with blood group O and their daughter has blood group O. Is this information enough to tell you which of the traits-blood group A or O- is dominant? Why or why not?
Ans: No, because the blood group is defined by a pair of genes, the information is insufficient. One came from the mother, while the other came from the father. In this situation, the youngster received the O blood group gene from both his mother and father.

25. How is the sex of the child determined in human beings?
Ans: A girl inheriting the X chromosome from her father will be a female, whereas a boy inheriting the Y chromosome will be a boy.

26. What factors could lead to the rise of a new species?

Ans: The following factors may contribute to the emergence of new species:
(a) In small breeding isolated populations, changes in gene frequency.
(b) Natural selection
(c) Changes in chromosomal number.

27. Will geographical isolation be a major factor in the speciation of self-pollinating plant species? Why or why not?

Ans: No, because geographical barriers prevent breeding between sexually reproducing individuals in a community. Furthermore, asexually reproducing organisms pass on parental DNA to offspring, eliminating the possibility of speciation.

28. Will geographical isolation be a major factor in the speciation of an organism that reproduces asexually? Why or why not?

Ans: Yes, the two populations are separated due to geographical remoteness. The amount of gene flow between them will dwindle. The isolated population will breed with the local population, resulting in the isolated population being included into the new population.

29. What are fossils? What do they tell us about the process of evolution?

Ans: Fossils are preserved evidence of living animals that are found closer to the earth's surface and are more recent in origin than fossils discovered in deeper layers. Fossils can also aid in the discovery of evolutionary relationships between creatures.

30. A study found that children with light-coloured eyes are likely to have parents with light coloured eyes. On this basis, can we say anything about whether the light eye colour trait is dominant or recessive? Why or why not?

Ans: No, because parents pass on two copies of qualities, one from the mother and the other from the father. We can't identify which is dominant and which is recessive unless we understand the nature of these two types of attributes. When both parents contribute a recessive gene, recessive features arise. We can only assume that both parents contribute a recessive gene based on this remark.

31. Explain the terms analogous and homologous organs with examples.

Ans: Analogous organs: These are organs that have similar functions but differ in structure and origin. For example, wings of birds and insects.
Homologous organs: Organs with identical structure and origin, but with different functions. Frog, lizard, and bird forearms are examples.

32. What evidence do we have for the origin of life from inanimate matter?

Ans: Stanley L. Miller and Harold C. Urey provided testimony in 1953. They created an atmosphere above water that was expected to exist on early Earth. They kept it at a temperature slightly below 100 degrees Celsius and stimulated lightning by passing sparks through the combination of gases. They discovered that 15% of the carbon had been transformed to simple carbon compounds, such as amino acids, which make up protein molecules, at the end of the week.

33. Explain how sexual reproduction gives rise to more viable variations than asexual reproduction. How does this affect the evolution of those organisms that reproduce sexually?

Ans: Variations occur as a result of either DNA copying errors or sexual reproduction. Genetic heterogeneity in the population rises from generation to generation as a result of sexual reproduction. Because sexually reproducing organisms acquire half of their genes from each parent, this occurs. These differences are critical to the evolution process.

34. Only variations that confer an advantage to an individual organism will survive in a population. Do you agree with this statement? Why or why not?

Ans: No, various individuals have different kinds of advantages depending on the kind of variances. However, when the environment undergoes a radical shift, only those organisms in the population that have a beneficial variation in that population would be able to live in the new environment.

35. How is the equal genetic contribution of male and female parents ensured in the progeny?

Ans: During sexual reproduction, both male and female parents contribute equally to the child. Each progeny trait is determined by a pair of alleles, and male and female gametes each have one allele. During fertilisation, each allele pair combines to determine phenotypes. As a result, child qualities are decided by equal genes from both male and female parents.

36. Is it true that when a new species is emerged, the old species is eliminated and why?

Ans: No, it is not true that as a new species emerges, the old one dies off.
Because when a species changes, it only affects a portion or a few individuals of the population. If the newly created species is better in any way, it will have a better chance of surviving, but if the genetic mutation is harmful to the environment, it will perish. As a result, unmodified members of other species may survive and thrive in a changing environment.

37. Why are traits acquired during life-time of an individual not inherited?

Ans: Changes in nonreproductive tissue or somatic cells cannot be passed on to the DNA of germ cells, hence traits acquired during a person's lifetime are not inherited. As a result, the acquired trait will perish with the individual's death. As a result, it is non-heritable and cannot be passed on through the generations.

38. The gene type of green stemmed tomato plants is denoted as GG and that of purple stemmed tomato plants as GG when these two are crossed.

i. What colour of stem would you expect in F_1 progeny?

Ans: Green is the colour of the F_1 progeny.

ii. Give the percentage of purple stemmed plants if F are self-pollinated.

Ans: In the F_2 generation, the percentage of purple stemmed plants was ¼ or 25%

iii. In what ratio would you find the gene types CG and Gg in the F progeny?

Ans: CG and Gg genotype ratio is $1:2$.

39. What are the causes of variations in clones?

Ans:

(i) Amid DNA copying inaccuracies

(ii) Acquired variation refers to the effect of the environment.

(iii)Mutations are unidirectionally inheritable, sudden stable alterations caused by changes in genetic make-up.

40. Only variation that confer and advantage to an individual organism will survive in a population. Do you agree with this statement? Why or why not?

Ans: We concur with the assertion. All of the variations do not have an equal chance of survival in their current environment. The nature of variation affects the probability of survival. Individuals benefit from a variety of advantages. In a heat wave, microorganisms that can endure heat will do better.

41. Study the given data and answer the questions following the data: Parental plants cross fertilised and seeds collected F_1 First Generation off springs F_2 of off springs of self-pollination of F_1 Male parents always bare red flowers, Female parent always had white flowers, 330 seeds sown and observed, all 330 gave red flowers, out of 44 seeds 33 seeds gave plants with red flowers and 11 seeds gave plants with white flowers.

(i) What is the term for this type of cross?

Ans: Monohybrid cross

(ii) What does the data of the column marked F indicate?

Ans: The red colour of the bloom takes precedence over the white flower.

(iii) Express the gene type of the (a) parents (b) F_1 progeny and (c) F_2 progeny
Ans:
(a) Parents – (RR) and (rr)
(b) F_1 progeny – Rr
(c) F_2 progeny – RR, Rr and rr

42. Wild cabbage was converted into number of variants like cauliflower, broccoli and cabbage by man. What is this process known as? Does it play an important role in organic evolution?
Ans: Artificial selection is the term for this method. Because it is similar to natural selection, it plays a crucial role in biological evolution. It aids in the production of new species with beneficial features in a shorter amount of time.

43. How are variant genotypes produced?
Ans: Variant genotypes can be created using the following methods:
(i) Gene and chromosomal mutations.
(ii) Gene recombination is a process in which two or more genes combine to form a

(iii)Gene hybridization is a term used to describe the process of combining two or more genes.

44. Can geographical isolation lead to speciation? How?
Ans: Geographic isolation can, in fact, lead to speciation. As a result of genetic drift, members of two subgroups may not be able to interbreed due to geographical isolation. Natural selection works differently in these subgroups as well. Speciation occurs as a result of this.

Long Answer Questions **5 Marks**

1. Answer the following questions:
(i) Who provided the evidence of DNA as genetic material?
Ans: Mendel.

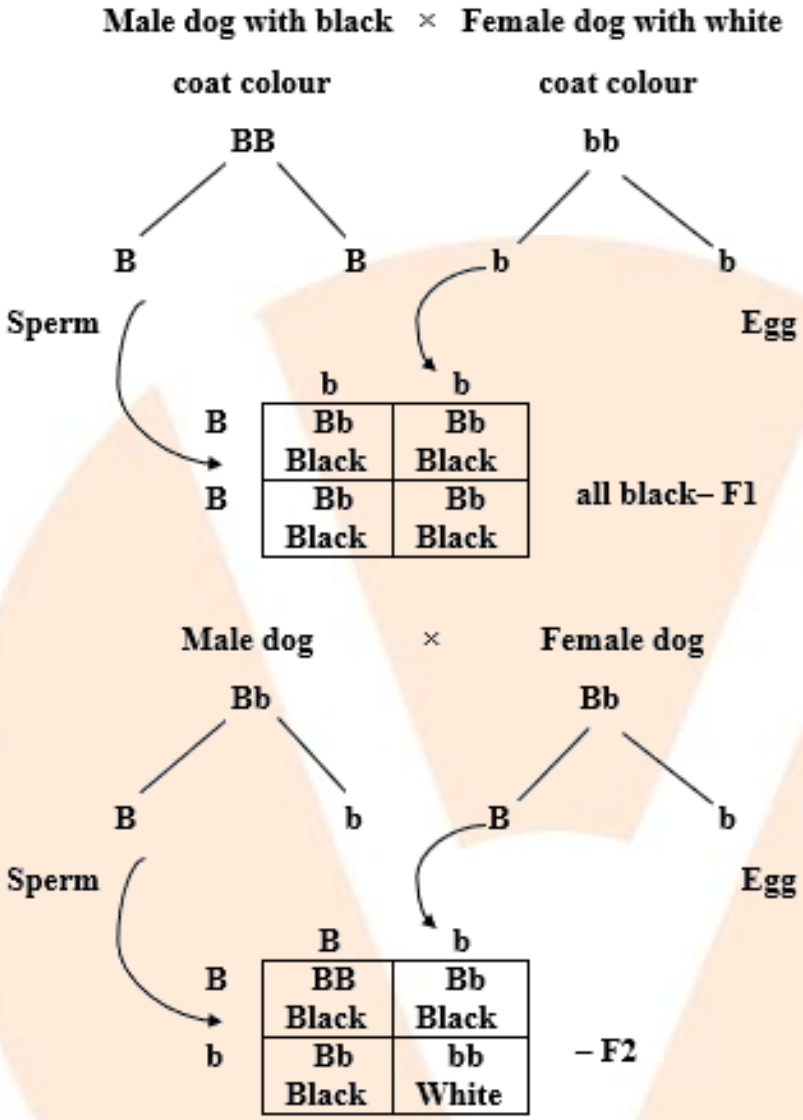
(ii) Why DNA is called polynucleotide?
Ans: DNA is made up of many different nucleotide units.

(iii) List three important features of double helical model of DNA.
Ans: Important features-

(a) In helical, both chains run anti-parallel.
(b) Purine (A, G) and pyrimidine are two nitrogenous bases (T, C).
(c) A will always bind to T, and C will always bind to G.

2. Give the basic features of the mechanism of inheritance.
Ans: Characteristics of the inheritance mechanism-
(a) A pair of elements influence each character. It's possible that the factors are similar or dissimilar.
(b) When two distinct character factors are present in an organism, only one of them manifests itself, while the other remains silent.
(c) At the moment of gamete production, two elements of a character are separated, leaving only one factor for that character.
(d) Inheritance of two or more pairs of contrasting features in such a way that one pair is independent of the other pairs.

3. Outline a project which aims to find the dominant coat colour in dogs.
Ans: Dogs have a variety of coats. Select a pure-bred male and female dog with a black coat (hair) colour or a pure-bred male and female dog with a brown coat (hair) colour to find dominant coat (hair) colour in dogs. Cross a homozygous male BB with a homozygous female BB, then look at the coat colour of the offspring (offspring). If all of the progeny are black, this indicates that in dogs, black will be the dominant coat colour, and if the progeny has brown coats, brown will be the dominant coat colour.



And, if we make the punnet square of the F_1 generation, we obtain Bb, Bb, Bb, Bb, i.e., all progeny is black. As a result, the dominant colour is determined to be black.