Heredity and Evolution: Exercise Questions

Q.1 A Mendelian experiment consisted of breeding tall pea plant 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 makeup of the tall parent can be depicted as?

(a) TTWW **(b) TTww**
(c) TtWW **(d) TtWw**

Sol. (c) TtWW

Q.2 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 a grass
(d) All of the above

Sol. (d) All of the above

Q.3 In evolutionary terms, we have more in common with
(a) A Chinese boy
(b) A chimpanzee
(c) A spider
(d) A bacterium

Sol. (a) A Chinese boy

Q.4 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?

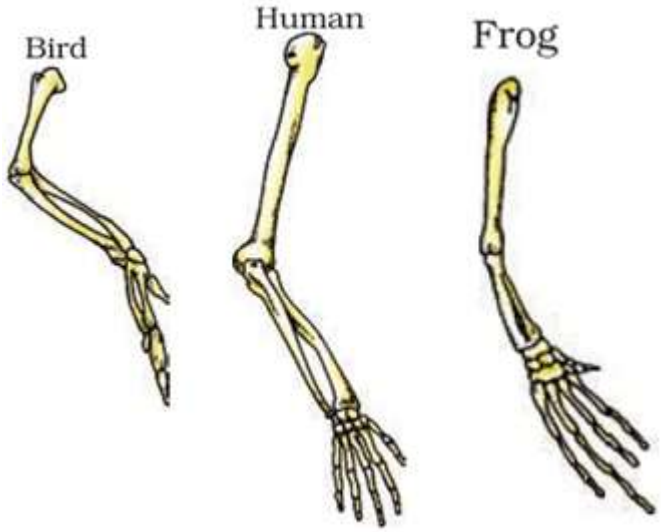
Sol. In given example, the information is not enough. For determining, a trait as dominant or recessive, we require the data of at least three generations. Here, data is about only two generations.

Q.5 How are the areas of study; evolution and classification interlinked?

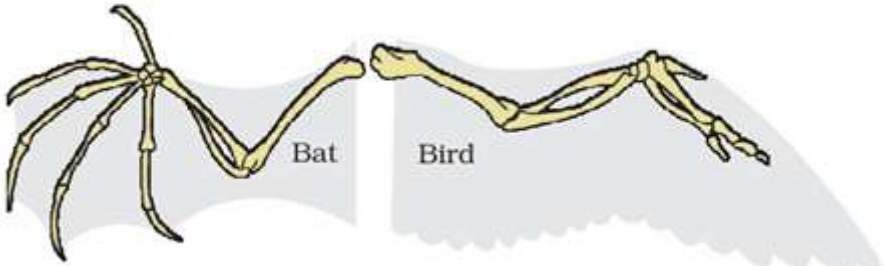
Sol. Evolution and classification are interlinked with each other. Through the classification we can explain the evolution. Classification is based on similarities and differences between the two species or two organisms. More similar characteristics of two species may relate their evolution. The modern system of classification is phylogenetic which means it is based on evolutionary relationships. Thus, evolution and classification are closely related.

Q.6 Explain the term analogous and homologous organs with examples.

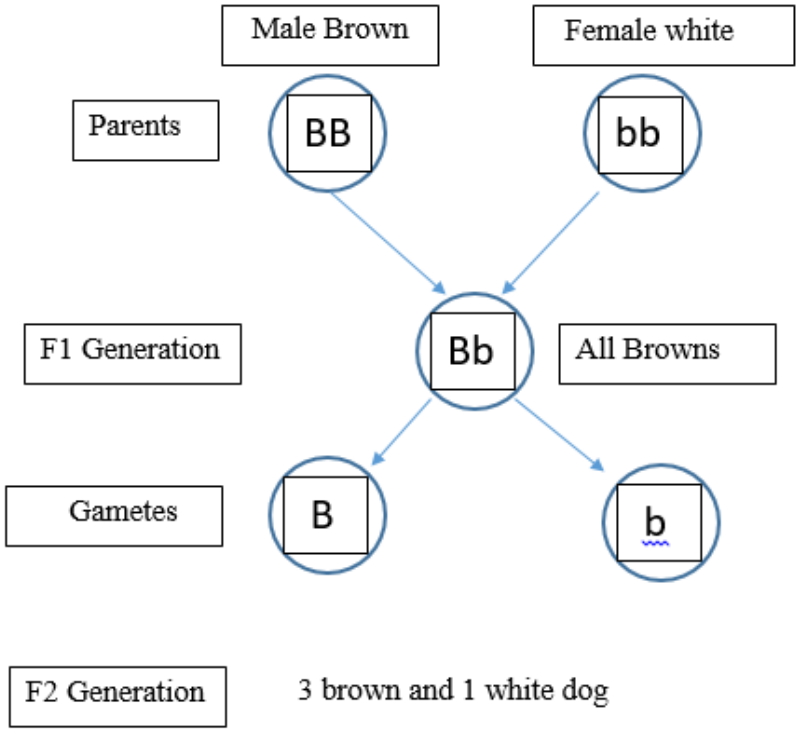
Sol. **Homologous Organs:** Homologous organs are the organs which have common basic structural design but perform different functions in different organisms are called homologous organs.
Example: the forelimbs of frog, human and birds.
The forelimbs of frogs are adapted to a jumping, forelimbs of birds are used for flying and forelimb of humans are used for handling tools.



Analogous Organs: Analogous organs are the organs which have different basic structural design but perform common function in different animals are called analogous organs.
Example: Wings of birds and wings of bat.



Q.7 Outline a project which aims to find the dominant coat colour in dogs.
Sol. For this project, take a homozygous brown coat (BB) male dog and a homozygous white coat (bb) bitch. Cross them to get the F1 generation.



	B	b
B	BB	Bb
b	Bb	bb

After that, allow the F2 generation. From tabulate data, If brown colour is dominant, out of every four 3 will be brown and one is white colour dog.

Q.8 Explain the importance of fossils in deciding evolutionary relationships.

Sol. Fossils are very helpful to know about certain animals which became extinct millions of years ago. Fossils of such animals give important clues and evidence about missing links in the evolutionary relationship. For example: The fossil of archaeopteryx is the missing link between the birds and reptiles. The fossil of archaeopteryx shows characters of birds and reptiles; which give information that birds have evolved from reptiles. In this way, the importance of fossils in deciding evolutionary relationships.

Q.9 What evidence do we have for the origin of life from inanimate matter?

Sol. The famous experiment by Stanley L. Miller and Harold C. Urey established that life originated from inanimate matter. These scientists repeated the conditions that might exist during the early years of Earth's origin. In this experiment, inorganic substances gave rise to amino acids. Amino acid are the bases of various biomolecules.

Q.10 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?

Sol. In sexual reproduction, genotype of the offspring is contributed by two different individuals. This opens the scope for various permutations and combinations. In addition, crossing during meiosis is another means for the production of various forms. Thus, there are more chances of variations during sexual reproduction, this increase the chance of evolution.

Q.11 How is the equal genetic contribution of male and female parents ensured in the progeny?

Sol. In Gametogenesis, meiosis is involved which leads to haploidy in the gametes. A zygote gets 50% of genes from both the parents. Thus, equal genetic contribution from male and female parents is ensured in the progeny.

Q.12 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?

Sol. This statement is correct to some extent. There are many obvious variations that help a person to survive. But there are some variations that are not probably beneficial, yet they are inherited through next generations. If we take the example of the colourful plumage of peacock. The colourful plumage of a peacock helps to finding a suitable mate but also makes it specific for its predators.