

- Q1.** 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.
- Q2** How does the creation of variations in a species promote survival?
- Q3** How do Mendel's experiments show that traits may be dominant or recessive?
- Q4.** 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
- [Hint: Here symbol T = tall
W = violet
t = short
w = white]
- Q5** Can the wing of butterfly and the wing of a bat be considered homologous organs? Why or why not?
- Q6.** 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.
- Q7.** 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?
- Q8.** 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?
- Q9** What are the different ways in which individuals with a particular trait may increase in a population?
- Q10** Why are traits acquired during the life-time of an individual not inherited?
- Q11** Why are the small number of surviving tigers a cause of worry from the point of view of genetics?
- Q12** What factors could lead to the rise of a new species?
- Q13.** Will geographical isolation be a major factor in the speciation of self-pollinating plant species? Why or why not?
- Q14.** Will geographical isolation be a major factor in the speciation of an organism that reproduces asexually. Why or why not?
- Q15.** Give an example of characteristics being used to determine how close two species are in evolutionary terms.
- Q16** What are fossils? What do they tell us about the process of evolution?
- Q17** Explain the importance of fossils in deciding evolutionary relationships.

Q18. In evolutionary terms, we have more in common with

- (a) a Chinese school-boy (b) a chimpanzee (c) a spider (d) a bacterium

Q19. 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?

Q20. How do Mendel's experiments show that traits are inherited independently?

Q21. 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?

Q22. How is the sex of the child determined in human beings?

Q23. What evidence do we have for the origin of life from inanimate matter?

Q24. Explain the terms analogous and homologous organs with examples.

Q25. How is the equal genetic contribution of male and female parents ensured in the progeny?

Q26. How are the areas of study – evolution and classification – interlinked?

Q27. In evolutionary terms, can we say which among bacteria, spiders, fish and chimpanzees have a 'better' body design? Why or why not?

Q28. 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?

- S1** Trait B, as it is present in larger number of individuals.
- S2.** Depending on the nature of variations different individuals would have different kinds of advantage *e.g.*, Bacteria variants which can tolerate heat have better survival chances in heat wave in comparison to non-variant bacteria having no capacity to tolerate heat wave.
- S3.** Trait present in all individuals in F1 is dominant and present in most individuals in a population is dominant while the one present in fewer individuals is recessive.
- S4** (c).
- S5** No, though the function of wing in both the cases is same but their structural plan and origin is different.
- S6** (d).
- S7.** Variations are a continuous process and may not show an immediate advantage. However, under drastically changed environment, only those organisms may survive, where the variation gives them that advantage. Hence, I do not agree with this statement.
- S8.** On the basis of population study whichever trait is more prevalent is the dominant one. In this case, the study says that light eye coloured children have light eyed parents. This clearly shows that it is a recessive trait so that both parents give the recessive gene for the child also to be homozygous recessive.
- S9.** The different ways in which individual with a particular trait may increase are:
(a) Natural selection. (b) Genetic drift.
Natural selection: Certain variations give more survival chances to individuals in a population in a changed situation resulting in increase of their population.
Genetic drift: Accidental changes in DNA of small population even if they give no survival advantage also lead to increase of certain individuals in population.
- S10.** Any change in non-reproductive tissues cannot be passed on to the DNA of the germ-cells. Therefore, the traits acquired during life-time of an individual are not inherited.
- S11.** It will affect the frequency of selection which is essential for survival. For effective selection, the population must consist of an infinitely large number of individuals in the population.
- S12.** Factors that would lead to rise of new species are:
(a) Migration (b) Natural selection (c) Geographical isolation (d) Mutation
- S13.** In self-pollinating species, because the gametes from same flower fuse to form the zygote, thus geographical isolation will not be a factor in speciation. Such plants are self sufficient for sexual reproduction and are hence not affected by such barrier.
- S14.** In asexually reproducing organism, geographical isolation will not be a factor in speciation as it does not require another individual for reproduction. Only one individual is capable of producing next progeny hence geographical isolation will not act barrier.
- S15.** Analysis of the organ structure in fossils allows us to make estimates of how far evolutionary relationships go, *e.g.*, presence of feathers in some fossil dinosaurs indicate the birds are closely related to reptiles. Another example is by comparing DNA of different species.

S16. Preserved traces of living organisms are called fossils. Fossils found closer to the surface of earth are more recent in origin than the fossils we find in deeper layers.

Fossils also help us to find evolutionary relation between organisms.

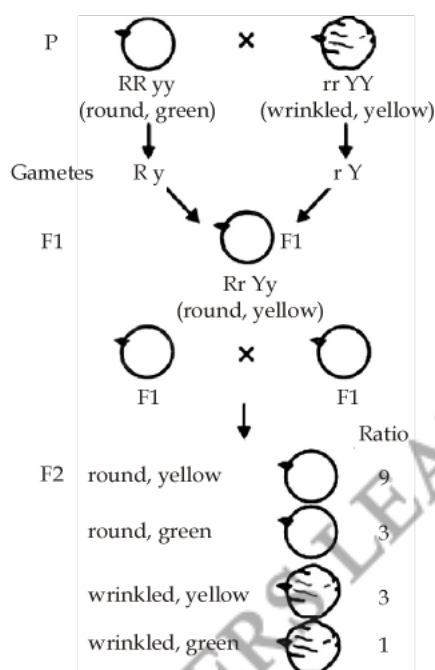
S17. Study of fossils helps us to know as to how characters/features have evolved in different groups of organisms. We also can find out which organism evolved earlier.

S18. (b) Chinese school boy is also Homo sapien so evolution has happened and led to speciation between chimpanzee and human beings.

S19. Variations arise either because of errors in DNA copying, during asexual reproduction, which will be fewer; or because of fusion of gametes from two individuals in sexual reproduction.

Since, in sexual reproduction, gametes from two different individuals, with different genetic make up, are involved so variations are much higher.

S20. When a pea plant having round green seeds is crossed with a pea plant having wrinkled yellow seeds in F₁ all the plants have round yellow seeds. However, in F₂ generation all the traits appear independently.



	RY	Ry	rY	ry
RY	RR YY Round, yellow	RR Yy Round, yellow	Rr YY Round, yellow	Rr Yy Round, yellow
Ry	RR Yy Round, yellow	RR yy Round, green	Rr Yy Round, yellow	Rr yy Round, green
rY	Rr YY Round, yellow	Rr Yy Round, yellow	rr YY Wrinkled, yellow	rr Yy Wrinkled, yellow
ry	Rr Yy Round, yellow	Rr yy Round, green	rr Yy Wrinkled, yellow	rr yy Wrinkled, green

Result : Round Yellow = 9
Round Green = 3
Wrinkled yellow = 3
Wrinkled Green = 1.

S21. Given: Man with blood group A, so genotype may be $I^A I^A$ or $I^A i$.

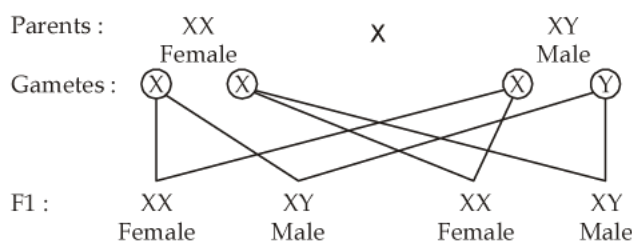
Woman with blood group O, so, genotype will be ii .

Daughter's blood group is O, so blood group will be ii .

This cross clearly shows that the daughter must get two genes from two parents. Since mother has both recessive genes, she can give only recessive gene. This implies that father must have genotype $I^A i$ (for blood group A) so as to give other 'i' to the daughter. Since, blood group O is expressed only in homozygous condition.

Thus, this information is enough.

S22. Human beings have 22 pairs of autosomes and one pair of sex chromosome. This pair is XX in females and xy in males. Thus, if parents are



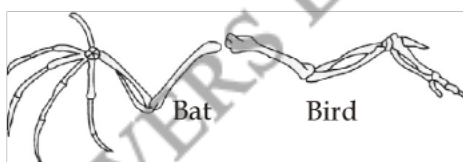
This cross shows that females produce all similar gametes, carrying X chromosome. while males produce two types of gametes 50% with X and 50% with Y chromosome.

Hence, when a female gamete fuses with sperm with X chromosome, a female child is produced and when it fuses with sperm with Y chromosome, a male child is produced.

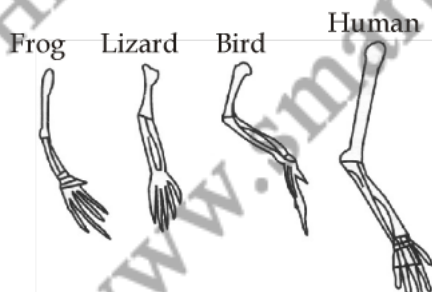
So, it is male that determines the sex of the child.

S23. This was given by fool-proof experiment by Urey and Miller in 1953. They simulated the conditions present on primitive earth, in a flask. This contained reducing gases like methane, hydrogen sulphide, hydrogen, carbon etc. The temperature, just below 100°C was maintained and current was passed. At the end of a week, it was found that simple biomolecules were formed that included amino acids. This proved that in this manner, biomolecules would have come together and life originated.

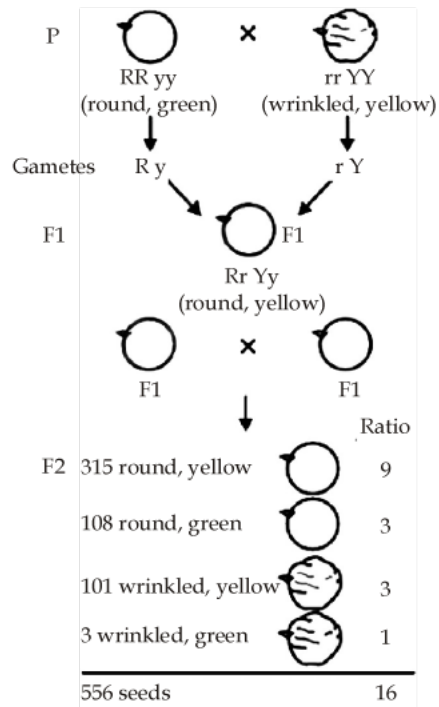
S24. **Analogous organs:** Such organs which perform similar function but are different in structure and origin. Example, wing of a bird and wing of an insect.



Homologous organs: Such organs which may have different functions but similar structure and origin. Example, fore arm of frog, lizard, bird and human.



S25.



In this cross, while the F1 expresses dominant trait of both the parents, the F2 expresses all four traits. These traits from two different parents are inherited independent of each other. Thus, it proves that both parents contribute equal genetic material.

S26. Organisms are classified on the basis of similarities and differences amongst them. Thus, organisms with similar features are grouped together. If another organism shows all features of a particular group and some modifications over it, then it is said to be more evolved. So one can say that in a particular group the organisms would have co-evolved.

S27. Amongst all the organisms given, since all are well adjusted in their specific requirement, so it can't be said as to which has a better body design. A simple bacteria can survive in thermal vents to polar regions. So they are all evolved organisms, some are more recent, while some are more ancient.

S28. Species is defined as a group of individuals that can interbreed. All human beings are *Homo sapiens* and are capable of interbreeding in spite of some differences. Thus, they are said to belong to the same species.