

- Q1.** How is the sex of a newborn determined in humans?
- Q2.** Do genetic combination of mothers play a significant role in determining the sex of a new born?
- Q3.** Mention three important features of fossils which help in the study of evolution.
- Q4.** Why do all the gametes formed in human females have an X chromosome?
- Q5.** In human beings, the statistical probability of getting either a male or female child is 50 : 50. Give a suitable explanation.
- Q6.** A very small population of a species faces a greater threat of extinction than a larger population. Provide a suitable genetic explanation.
- Q7.** What are homologous structures? Give an example. Is it necessary that homologous structures always have a common ancestor?
- Q8.** Does the occurrence of diversity of animals on earth suggest their diverse ancestry also? Discuss this point in the light of evolution.
- Q9.** Give the pair of contrasting traits of the following characters in pea plant and mention which is dominant and recessive (a) yellow seed (b) round seed
- Q10.** Why did Mendel choose pea plant for his experiments?
- Q11.** A woman has only daughters. Analyse the situation genetically and provide a suitable explanation.
- Q12.** Does geographical isolation of individuals of a species lead to formation of a new species? Provide a suitable explanation.
- Q13.** Bacteria have a simpler body plan when compared with human beings. Does it mean that human beings are more evolved than bacteria? Provide a suitable explanation.
- Q14.** All the human races like Africans, Asians, Europeans, Americans and other might have evolved from a common ancestor. Provide a few evidences in support of this view.
- Q15.** Differentiate between inherited and acquired characters. Give one example for each type.
- Q16.** Give reasons why acquired characters are not inherited.
- Q17.** Evolution has exhibited a greater stability of molecular structure when compared with morphological structures. Comment on the statement and justify your opinion.

Q18. In the following crosses write the characteristics of the progeny

Cross	Progeny
(a) RR YY × RR YY Rounded, yellow Round, yellow
(a) Rr Yy × Rr Yy Rounded, yellow Round, yellow
(a) rr yy × rr yy Wrinkled, green wrinkled, green
(d) RR YY × rr yy Rounded, yellow wrinkled, green

Q19. Study the following cross and showing self pollination in F₁, fill in the blank and answer the question that follows:

Parents	RR YY	×	rr yy
	Round, yellow		wrinkled, green
F ₁ :	Rr Yy	×	?
	Round, yellow		

Q20. In Question 8, What are the combinations of character in the F₂ progeny? What are their ratios?

Q21. Give the basic features of the mechanism of inheritance.

Q22. Give reasons for the appearance of new combinations of characters in the F₂ progeny.

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- S1.** The sex of the individual is genetically determined i.e., genes inherited from parents decide whether the new born will be a boy or a girl. A new born who inherits an 'X' chromosome from father will be a girl and one who inherits a 'Y' chromosome will be a boy.
- S2.** No, because mothers have a pair of X-chromosomes. All children will inherit an 'X' chromosome from their mother regardless of whether they are boys or girls.
- S3.** (a) Fossils represent modes of preservation of ancient species.
(b) Fossils help in establishing evolutionary traits among organisms and their ancestors.
(c) Fossils help in establishing the time period in which organisms lived.
- S4.** Human females have two X chromosomes called sex chromosomes. During meiosis at the time of gamete formation, one X chromosome enters each gamete. Hence, all the gametes possess an X chromosome.
- S5.** The sex of an infant is determined by the type of sex chromosome contributed by the male gamete. Since the ratio of male gametes containing X chromosome and those containing Y chromosome is 50 : 50, the statistical probability of male or a female infant is also 50 : 50.
- S6.** Fewer individuals in a species impose extensive inbreeding among them. This limits the appearance of variations and puts the species at a disadvantage if there are changes in the environment. Since, the individuals fail to cope up with the environmental changes, they may become extinct.
- S7.** Structures which have a common basic structure but perform different functions are called homologous structures. *e.g.*, fore limbs of reptiles, amphibians and mammals. Yes, they have common ancestor but variously modified to carry out different activities.
- S8.** Though animals have a vast diversity in structures they probably do not have a common ancestry, because common ancestry may greatly limit the extent of diversity. As many of these diverse animals are inhabiting the same habitat, their evolution by geographical isolation and speciation is also not likely. Thus, a common ancestry for all the animals is not the likely theory.
- S9.** (a) yellow — dominant
green — recessive
(b) round — dominant
wrinkled — recessive
- S10.** (a) Short to grow (b) Easily distinguishable characters
(c) Larger size of flower (d) Self pollinated
- S11.** (a) The woman produces ova with 'X' chromosome
(b) The man produces sperms with X and Y chromosome which actually determines the sex of the baby.
- S12.** Yes, geographical isolation gradually leads to genetic drift. This may impose limitations to sexual reproduction of the separated population. Slowly the separated individuals will reproduce among themselves and generate new variations through a few generations may ultimately lead to the formation of a new species.
- S13.** This is a debatable issue. If appearance of complexity is concurrent with evolution then, human beings are certainly more evolved than bacteria. But if we take the totality of life characteristics into account, then it is hard to label either organism as evolved.

S14. Hints: Common body plan, structure, physiology and metabolism.

Constant chromosome number.

Common genetic blue print.

Freely inter-breeding.

S15. Characters that are passed on from parents to offspring are inherited characters *e.g.*, colour of seeds, colour of eyes.

Characters appearing in an individual's life time but cannot be transmitted to next generation are acquired characters *e.g.*, obese body, loss of a finger in an accident.

S16. Acquired characters do not produce change in the DNA of germ cells, so they cannot be inherited. Only those characters which have a gene for them can be inherited.

S17. We see immense diversity in size, form, structure and morphological features in the living world. But at the molecular level these, diverse types of organisms exhibit unbelievable similarity. For instance, the basic biomolecules like DNA, RNA, carbohydrates, proteins etc. exhibit remarkable similarity in all organisms.

S18. (a) Round, yellow (b) Round, yellow (c) Wrinkled, green (d) Round, yellow
Round, yellow
Wrinkled, green
Wrinkled, green

S19. Rr Yy Round, yellow.

S20. (a) Round, yellow – 9 (c) Round, green – 3
(b) Wrinkled, yellow – 3 (d) Wrinkled, green – 1
9 : 3 : 3 : 1

S21. (a) Characters are controlled by genes.
(b) Each gene controls one character.
(c) There may be two or more forms of the gene.
(d) One form may be dominant over the other.
(e) Genes are present on chromosomes.
(f) An individual has two forms of the gene whether similar or dissimilar.
(g) The two forms separate at the time of gamete formation.
(h) The two forms are brought together in the zygote.

S22. The tall/short and round/wrinkled seed trait are independently inherited.