

GENETICS QUESTIONS

1. Define: (a) gene (b) chromosome (c) genetics.
2. How many chromosomes are there in a normal human: (a) gamete (b) body cell?
3. Do all organisms have the same number of chromosomes as humans?
4. What are the sex chromosomes of a human male, and of a human female?
5. Would all sexually-reproducing organisms have the same sex chromosomes as humans?
6. What do the following genetic symbols mean: A, a, AA, aa, Aa?
7. What are alleles?
8. What is meant by the term " true-breeding"?
9. Distinguish between a genotype and a phenotype.
10. If two organisms have the same phenotype, does this mean they have the same genotype?
11. If two organisms have the same genotype, does this mean they have the same phenotype?
12. In peas, yellow colour is dominant to green. What will the colours of the offspring of:
 - (a) a homozygous yellow and a green pea plant
 - (b) a heterozygous yellow and a green pea plant
 - (c) a heterozygous yellow and a homozygous yellow pea plant
 - (d) two plants that are hybrid for the yellow pea seed ?
13. Could two brown-eyed parents have a blue-eyed child? Explain.
14. Could two blue-eyed parents have a brown-eyed child?
15. A blue-eyed man, both of whose parents were brown-eyed, marries a brown-eyed woman whose father was blue-eyed and whose mother was brown-eyed. This man and this woman have a blue-eyed child. What are the genotypes of all the individuals mentioned?
16. In guinea pigs, rough coat is dominant to smooth coat. How could one determine whether a rough-coated guinea pig was homozygous or heterozygous for that trait?

17. There are a number of human abnormalities that are recessive. During this century, marriages between closely-related people have become less common. What effect might this have on the incidence of recessive abnormalities?

18. If two animals heterozygous for a single pair of genes are mated and have 200 offspring, about how many have the dominant phenotype?

19. Two long-winged flies were mated and the offspring included 77 with long wings and 24 with short wings.

(a) Is the short-winged condition dominant or recessive?

(b) What are the genotypes of the parents?

20. In rabbits, spotted coat (S) is dominant to solid colour (s) and black (B) is dominant to brown (b). A brown spotted rabbit is mated to a solid black one and all the offspring are black spotted.

(a) What are the genotypes of the parents?

(b) What would be the appearance of the F₂ generation if two of the F₁ black spotted rabbits were mated?

21. Outline a breeding programme whereby a true-breeding strain of red cattle could be established from a roan bull and a white cow.

22. What are multiple alleles? Give an example.

23. In a family of four, one child is blood group A, one is B, one is AB, and the other is O. What are the genotypes and phenotypes of the parents?

24. Mrs. Smith and Mrs. Jones had babies at the same maternity hospital at the same time. Mrs. Smith took home a girl and named her Sue. Mrs. Jones took home a boy and named him Jim. However she was sure she had a girl and brought suit against the hospital. Blood tests showed that Mr. Jones had blood type O, Mrs. Jones was type AB, both Mr and Mrs Smith were type B,

Sue was type A and Jim was type O. Had an exchange occurred?

25. Explain why approximately half the human population is male and approximately half are female.

26. Explain what is meant by sex-linked inheritance.

27. The inheritance of red-green colour blindness in humans is sex-linked. What are the possible offspring of a red-green colour-blind man and a normal-sighted homozygous woman?

28. One pair of genes for coat colour in cats is sex-linked. The gene B produces a yellow coat, b produces a black coat, and the heterozygous Bb produces a tortoise-shell colour. What kind of offspring result from the mating of a black male and a tortoise-shell female?

29. What are some of the possible effects of radio-activity on living things?