

Genetics Review Questions

1. Serendipity played a big part in Mendel's choice of the garden pea. Explain.
2. Explain how the dominant phenotype can have more than one genotype.
3. Is it possible to be heterozygous for a trait and show the recessive phenotype? Explain.
4. What is a test cross? Why does one use it? Explain the two possible outcomes and what it tells you.
5. A flower grower is looking for new varieties of petunias. He crosses a yellow flower plant with a blue one and gets green flowered plants. Explain how this is possible.
6. What principle of genetics states that the inheritance of one characteristic does not affect the inheritance of another?
7. A mother has two alleles for a given trait. How many does she give to an offspring? What principle of genetics describes this?
8. Plants grown by vegetative propagation (*i.e.*, by cuttings) have exactly the same traits as the parent plants. Plants grown from seeds may vary from the parent plants in many ways. Explain.
9. Does the height of a pea plant affect the color of its flowers? Why or why not?
10. In a monohybrid cross between homozygous dominant and homozygous recessive parents, there are 32 offspring in the F_2 generation. How many of the offspring would you expect to show the recessive trait?
11. Of all the chromosomes in one of your cells, half came from each of your parents. About what fraction came from each of your grandparents? Your great-grandparents?
12. A couple has three sons and one daughter. What is the probability that a fifth child will be female? Explain your answer.
13. A roan calf's parents were a white cow and a red bull. What is the roan's genotype? Can two roans mate and produce all roans? Explain.
14. What are polygenic traits? Give an example of a trait controlled by polygenic inheritance.
15. What makes the inheritance of human ABO blood groups interesting?
16. Mary has blood type A and she marries John, whose blood type is B. They have three children: Joan, James and Pete. Joan has blood type O, James has blood type A, and Pete has blood type B. Explain how this is possible.
17. If a man who has type O blood marries a woman who is heterozygous for type B blood, what is the probability of them having a child with B type blood? Type O blood?
18. Mr. and Mrs. Doe had a child named Flo at the same time Mr. and Mrs. Roe had their son Joe. The Roes took Joe home, and after looking at him they claimed that Joe was not their child. They were going to sue the Hospital for the mix up. The Hospital took the blood types of all six individuals to try and prove there was no mix up. The results of the tests were as follows: Mr. Roe had A blood type; Mrs. Roe had A blood type; Joe had O blood type; Mr. Doe had O blood type; Mrs. Doe had AB blood type and Flo had A blood type. Was there a mix up? Explain.
19. Why are there more males with sex-linked genetic disorders than females?
20. Explain why probability is a useful genetic tool.
21. Explain why a large sample is more statistically reliable than a small sample?
22. In sheep, white coat is dominant. Black is recessive. Occasionally, a black sheep appears in a flock. Black wool is worthless. How could a farmer eliminate the genes for black coat from the flock?
23. In a certain animal, one variety always has a hairy tail while another always has a naked tail. How would you determine which trait is dominant?
24. Huntington's chorea is a dominant neurological disorder that usually appears when a person is between 35 and 45 years of age. Many people with Huntington's chorea, however, do not show symptoms until they are well into their sixties. How does the slow development of the disease explain why it has not been eliminated by natural selection.
25. Explain the significance of identifying the alleles which cause genetic disorders.
26. In most cultures, it is unacceptable to marry your immediate relatives. Using the principles of genetics, explain why inbreeding in humans is discouraged.

27. In humans, which parent determines the sex of the offspring? Explain.
28. While examining a population of fruit flies, you notice that a certain trait never appears in males. How can you account for this?
29. What does it mean if we say genes are linked? Which law of inheritance do linked genes violate?
30. How are crossover frequencies used to make chromosome maps.
31. What causes incomplete linkage?