

Genetics Assignment

/13 K

/37A

/14 T

/5C

/69 total

Answer the following questions on a separate piece of paper.

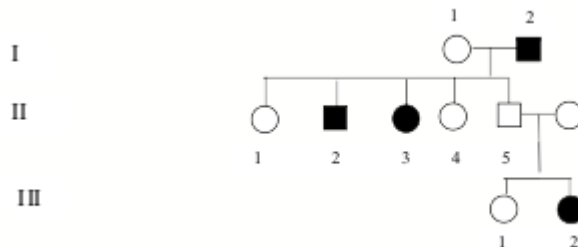
Make sure that you read the questions through completely and answer **ALL** parts of the questions asked to ensure full marks.

The marks for each question are in brackets following each question.

Use a punnett square when needed to answer the questions.

1. In dogs, long hair is recessive to short hair. A true-breeding (homozygous) short-haired male is mated to a long-haired female. What will their puppies look like? (3K)
2. Two donkeys are mated. One of the parent donkeys is long-haired (recessive allele). The litter which results contains two short-haired and three long-haired donkeys. What does the second parent look like, and what is its genotype? (3A)
3. Mrs. And Mr. Jones both have widow's peaks (dominant). Their first child also has a widow's peak, but their second child doesn't. Mr. Jones accuses Mrs. Jones of being unfaithful to him. Is he necessarily justified? Why or why not? Work the genetics problem predicting the frequencies of the versions of this trait among their prospective children. (3T)(2C)
4. Mr. and Mrs. Doe have six children. Three of them have attached earlobes (recessive) like their father, and the other three have free earlobes like their mother. What are the genotypes of Mr. and Mrs. Doe and of their numerous offspring? (5K)
5. In cows, black color is dominant to an albino gene which produces cows white fur and red eyes. A short haired (dominant) albino colored female is bred to a long-haired black male. They have eight calves: 2 black, short-haired; 2 black, long-haired; 2 albino, short-haired; and 2 albino, long-haired. What were the genotypes of the two parents? (4A)
6. Elizabeth is married to John, and they have four children. Elizabeth has a straight nose (recessive) and is able to roll her tongue (dominant). John is also able to roll his tongue, but he has a convex (Roman) nose (dominant). Of their four children, Ellen is just like her father, and Dan is just like his mother. The other children—Anne, who has a convex nose, and Peter, who has a straight nose—are unable to roll their tongues. Please answer the following questions about this family.
 - a. What are the genotypes of Elizabeth and John? (2A)
 - b. Elizabeth's father was a straight-nosed roller, while her mother was a convex-nosed non-roller. What can you figure out about **their** genotypes? (2T)
 - c. John's father was a straight-nosed roller, while his mother was a convex-nosed roller. What can you determine about their genotypes? (2A)
 - d. Diagram the three described generations of this family in accepted pedigree form, including the phenotypes for these two traits. (5A)(1C)
7. In fruit flies (*Drosophila*), one eye color gene is X-linked, with a recessive white allele and a dominant red allele. If white-eyed female flies are bred to red-eyed male flies, describe the expected offspring (assume all parental flies are true-breeding). What results do you expect if you do the **reciprocal cross** (reverse the phenotypes of the parent flies)? (3T)

8. Ted has normal color vision, while his wife Fran is colorblind. Colorblindness is an X-linked trait, and the normal allele is dominant to the colorblindness allele. If they have a large family, what are the potential genotypes and phenotypes of their offspring? (4A)
9. In cats, there is a coat color gene located on the X chromosome. This gene has two alleles—orange and black. A heterozygous cat has tortoiseshell color. Predict the genotypic and phenotypic frequencies among the offspring of the following crosses. Pay careful attention to the **genders** of the offspring.
- Black female X Orange male (3A)
 - Orange female X Black male (3A)
 - Tortoiseshell female X Black male (3A)
 - Tortoiseshell female X Orange male (3A)
10. In a particular family, one parent has Type A blood, the other has Type B. They have four children. One has Type A, one has Type B, one has Type AB, and the last has Type O. What are the genotypes of all six people in this family? (3T)(3K)
11. In a recent court case, a young woman accused a soldier of being the father of her child. The soldier, of course, denied it. The soldier's lawyer demanded that blood types be taken to prove the innocence of his client. The following results were obtained: Alleged father, Type O. Mother, Type A. Child, Type AB. The court found the soldier guilty on the basis of the woman's remarkable memory for dates and details that apparently eliminated all other possible fathers. What are the possible genotypes for these three people? (3T)
Is the soldier the father? (2C)
12. The following pedigree shows the transmission of a rare, but not fatal, genetic disorder in a family:



- Identify the mode of inheritance suggested by the pedigree is it autosomal or sex-linked. (1K)
 - Indicate the genotypes of all the individuals in the pedigree above. (3A)
13. Elephantitis is a rare sex-linked disease. 2 normal parents have 4 children, 2 girls and 2 boys none of which show the Elephantitis disease. One of their daughters marries a man with Elephantitis, they have 2 normal boys and a normal girl who marries a normal man, they have 2 boys who both have Elephantitis.
- Is the trait dominant or recessive? (1K)
 - Draw a pedigree for the given information with the possible genotypes for all the individuals. (2A)