

Lab 8- Practice Genetic Problems

Complete the following problems on your own as practice for the quiz and for the exam. The answer key is available online.

1. Pigmented skin is dominant over non-pigmented (albino) skin. Curly hair is incompletely dominant over non-curly hair. A person who is heterozygous for curly hair (wavy) and pigmented skin and a person who has pigmented skin (genetically homozygous for this trait) but has straight hair decide to have a child.

- What is the chance of their having a curly haired child with pigmented skin?
- What is the chance of their having a straight haired child with non-pigmented skin?
- What is the chance of their having a straight haired child with pigmented skin?

2. Ability to curl your tongue is a dominant trait. If two persons who were heterozygous for this trait had a child, what is the probability that the child would also be heterozygous for the trait?

3. Hemophilia is a sex-linked disease. Homozygous recessive genes are needed on the X chromosomes) for the disease to be expressed. A man who does not have this disease and a woman who is a carrier (heterozygous for the disease) decide to have children.

- What are the genotypes of this man and woman?
- What is the possible genotype of a son?
- What is the possible genotype of a daughter?
- What is the probability of a son having hemophilia?
- What is the probability of a daughter having hemophilia?

4. Marfan's syndrome is a genetic trait inherited in a dominant mode. The trait causes a weakening of the aorta that can be fatal unless surgically corrected. A teenager whose mother was affected with the disease, but whose father was unaffected is concerned that she may have the trait.

- What is the phenotype of each of her parents? Genotypes?
- What is the chance that the teenager has Marfan's syndrome?

5. In some dogs, barking while chasing rabbits is due to a dominant gene, others do not bark. Dogs with erect ears are dominant to dogs with drooping ears. By crossing a heterozygous erect-eared barker with a droop-eared silent dog, what kind of pups would you expect?

6. A woman with blood type A has a child with blood type O. Which blood type is NOT a possibility for the father of the child?

7. In a case of disputed paternity you, as the expert witness, were told the mother has type A blood, the child has type O, and the alleged father has type B blood. How would you respond to the following statements?

a. The attorney for the alleged father asks "since the mother has type A blood, the type O blood of the child must have come from the father, and since my client has type B blood, he obviously could not have fathered the child.

b. Her attorney states, "Further tests reveal that this man is heterozygous and therefore, he must be the father".

8. The dominant allele K is necessary to hear. However, the dominant allele M of another independent gene always results in deafness no matter what other genes are present. Parents who have the genotypes $kkMm \times KkMm$ have a child. What are the chances that the child will be able to hear?

9. One human gene, which was once thought to be X-linked, controls the length of hair on men's ears. If a man with hairy ears has sons, all of them will have hairy ears, but if he has daughters none of them will have hairy ears. Can you explain why these differences exist?

10. A person affected by Turner's syndrome has only a single sex (X) chromosome, yet may survive. On the other hand, a person having a single Y chromosome will not survive. Explain why.

11. If nondisjunction of the two X chromosomes occurs during oogenesis, then some eggs will have two X chromosomes and some eggs with no X chromosomes. If a normal sperm fertilizes these two types of eggs, what genotypes are possible?