AP Biology Genetics Problems

Monohybrid Crosses (One-trait)

1. ***Sample Problem***: The Gene for tall is dominant over dwarf in the garden pea plant used by Mendel. A pea plant that comes from a line of plants that are all tall is crossed with a dwarf pea plant. What is the phenotype of the F1 generation? What is (are) its genotype(s)?

2. If the offspring generation of problem 1 is crossed with the tall plant from a tall lineage, what will be the phenotype(s) and in what ratios for the offspring? What will be the genotype(s) and in what ratios?

3. If the F1 generation of problem 1 is crossed with the dwarf parent from a dwarf lineage, what will be the genotypes and the ratios of the offspring, and the phenotypes and ratios of the offspring?

4. The genes for dark eyes (black and brown) usually dominate over genes for blue or gray eyes. A man with black eyes marries a woman with light gray eyes. They have two children, a boy with black eyes, and a girl with blue eyes. What are the genotypes of the man, his wife, the little boy, and the little girl?

5. A man with brown eyes marries a woman with blue eyes. They have 12 brown-eyed children. What are the genotypes of the man, his wife and all the children?

6. A brown-eyed man marries a blue-eyed woman. They have four children, two with brown eyes, and two with blue eyes. What are the genotypes of all these people?

7. A brown-eyed man with a blue-eyed mother marries a brown-eyed woman with a blue-eyed father. What is the probability that their first child will be brown-eyed? That the second child will be brown-eyed?

8. A man and a woman have 24 children. Of the children, 17 have brown eyes and 7 of the children have blue eyes. What are the genotypes of the parents?

9. Assume that the dimple is inherited as a simple dominant gene. A dimpled man whose mother has no dimple marries a woman with no dimple. What is the probability that they will have a child with a dimple?

10. Sickle cell anemia (SCA) is a human genetic disorder caused by a recessive allele. A couple plans to marry and wants to know the probability that they will have an affected child. With your knowledge of Mendelian inheritance, what can you tell them if (a) both are normal, but each has one affected parent and the other parent has no family history of SCA; and (b) the man is affected by the disorder, but the woman has no family history of SCA?