Bio 210A
Practice Genetics Questions

1. In humans, differences in the ability to taste phenylthiourea are due to a pair of autosomal alleles. Inability to taste is recessive to ability to taste. A child who is a non-taster is born to a couple who can both taste the substance. What is the probability that their next child will be a taster?

To guide your thinking about the answer, the following is a suggested systematic process:

a. How many alleles are there per person? 
   
b. Specify a letter to denote the dominant and recessive alleles:
   Dominant , recessive .

c. What is the genotype of the non-tasters? 
   
d. What are the possible genotypes of tasters in general? , .

e. Given that taster parents have a non-taster child, what are their genotypes? 
   
f. Draw a Punnett square , specify the phenotypes and genotypes of both parents and all possible offspring.

g. What is the probability that the next child is a taster? 
   
h. What is(are) the genotype(s) of the next child if it is a taster? 

2. Cystic fibrosis (CF) is an autosomal recessive disorder. You are a genetic counselor.
   
a. A family just learned that their second child has CF. Explain the autosomal recessive disorder statement to this family where both parents do not have cystic fibrosis.

b. Explain to them the probability that their next child may have CF using a Punnett’s square.
c. The parents are concerned that their first un-affected child may pass CF to their
grand children. Explain to them the numerical probability that their first child
may not be a carrier of a CF gene (allele), with a homozygous genotype, or that
the same child may be a carrier of the CF gene, with a heterozygous genotype.

3. In humans, red-green color blindness is due to an X-linked recessive gene. A color-
blind daughter is born to a woman with normal color vision and to a father who is
color-blind. Use B for normal and b for the color blindness gene.
   a. What is the mother’s genotype with respect to the alleles concerned?

   b. Draw the Punnett’s square to show the probability that the daughter may have a
color-blind son if her husband has normal vision.

3. A woman of blood group AB marries a man of blood group A whose own father (the
grandfather) father was group O. Using a Punnett square and what you learned about
the laws of probability, first determine the genotypes of both parents then calculate
the probability that
   a. one child will have group B
   b. one child will have group O
   c. the first child will have blood group AB
   d. the first child will be son.
   e. the first child will be a son with blood group AB
   f. the second will be a son with blood group B
   g. the first child will be a son with blood group AB and the second will also be a
      son with blood group