Mendelian Genetics Worksheet #1
(show your work)

1. Given a pair of alleles A and a (where A is the dominant allele), and a mating of Aa X aa, what proportion of the offspring will show the dominant trait?

2. Huntington's disease is known to have a dominant mode of inheritance. P. and H. marry and have two children, J. and C. At age 46, P. contracts Huntington's disease. J. contracts Huntington's disease at age 48. However, C. shows no signs of HD and lives well into his 80's.

   What can you conclude about the genotypes of the parents?

   Will C. pass the gene for Huntington's disease to his offspring?

3. In the case of sickle-cell anemia, persons with an AA genotype are normal, personas with an Aa genotype are phenotypically normal but are carriers of the disorder, and persons with an aa genotype are eventually afflicted with sickle-cell anemia. K. and T. are sisters who are both carriers of the a allele for sickle-cell anemia (Aa).

   K. marries S., another carrier of the a allele for sickle-cell (Aa). What proportion of their offspring will have sickle-cell anemia? What proportion will be carriers of the disorder? What proportion will be normal?

   T. marries M., who does not carry the a allele (AA). What proportion of their offspring will have sickle-cell anemia? What proportion will be carriers of the disorder? What proportion will be normal?

4. Red-green color blindness is known to have a sex-linked recessive mode of inheritance. X represent the normal allele and X_m represents the allele for color blindness. If males receive the X_m allele from their mother, they will be color blind (X_mY). Females, on the other hand, must get the X_m allele from both parents in order to be color blind ($X_m X_m$).

   a. Can a color blind father have daughters who are not color blind? Explain.

   b. List all possible offspring (boys separately from girls) (genotypes and phenotypes) and their expected frequencies resulting from the mating of a color blind father (X_mY) and a color blind mother ($X_m X_m$).