CSS 350
Homework Assignment #1
Assigned 1/19/01
Due 1/26/01 (by the end of class)

1) Define (in a sentence that you create):
   a. Gene

   b. Allele

   c. Monohybrid

   d. Zygote

   e. Genotype

   f. Phenotype

   g. Pure-breeding

   h. Self pollination

Background for questions 2 and 3: Look at Figure 1.7 on page 14 of chapter 1. We aren't told what the genotypes are for the two plants involved in the illustrated cross-pollination— and we don't know if they are true breeding. We do know the following:
   a) The male has purple flowers.
   b) The female has white flowers
   c) The seed in the pods forming on the female are both yellow and green

2) Explain in complete sentences why the male plant could have one of two possible genotypes for flower color (using 'P' and 'p' to represent the alleles of the flower color locus)
3) In complete sentences, explain why we know exactly what the female genotype is for flower color.

4) Explain in complete sentences why we know the female genotype for seed color could not be homozygous dominant.

5) Seeds from the pods of one pea plant can have one of the following characteristics: all green, all yellow, or both green and yellow. The table below lists all possible combinations of male and female seed color genotypes for a cross between two plants. Mark the correct box (just one per mating) for the expected outcome of each of the possible matings.

<table>
<thead>
<tr>
<th>Male genotype</th>
<th>Female genotype</th>
<th>Color of seeds in pods on the female plant</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>all green</td>
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<td>YY</td>
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Background for questions 6 through 9: A bag contains 1 million well mixed marbles. 100,000 are red, 500,000 are green, and the rest are blue.

6) what is the probability (expressed as a number, i.e., 0.2) that a single marble taken at random from the bag is:
   a) red:
   b) green:
   c) blue:

7) What is the ratio of marble colors in the bag?

8) What is the probability that two marbles you pick at random are red? Explain which laws of probability apply to this question.

9) Explain in your own words the Law of the product.

10) Explain in your own words the Law of the Sum.

11) Assume you are withdrawing two marbles from the bag. What is the probability of randomly picking one red and one green marble? Explain why. Explain which laws of probability apply to this question.

12) What is the probability that a yellow F3 seed in the cross depicted in Figure 1.12 will grow to have a plant that when self pollinated has both yellow and green seeds?