Heredity Practice 3

**Respond to these problems on a separate sheet of paper. Clearly number each question. Show all work. Ignoring these directions will result in a zero.**

1. Red-green colorblindness is an x-linked recessive disorder. A man who is not red-green colorblind marries a woman who is a carrier of red-green colorblindness. The man and the woman both have type AB blood.   
     
   A) What are the chances that their first child will be a female carrier of red-green colorblindness?  
   **1/4**  
   B) What are the chances that their first child will have type A blood?  
   **1/4**  
   C) What are the chances that their first child will be a red-green colorblind male with type AB blood? **1/8**
2. In fruit flies, sex chromosomes work exactly the same way that human sex chromosomes do. Having white eyes is a recessive x-linked trait in fruit flies; the dominant phenotype is red eyes. Body color is not x-linked; a brown body is dominant and a yellow body is recessive. A white-eyed male who is heterozygous for body color mates with a yellow female who is heterozygous for eye color.
3. What are the genotypes of these two flies?  
   **XrYBb, XRXrbb**
4. What percentage of the F1 will be yellow?  
   **50%**
5. What percentage of the F1 will be red-eyed males?  
   **25%**
6. What percentage of the F1 will be brown females?

**25%**

1. In humans, being immune to poison ivy is a dominant phenotype while being susceptible to poison ivy is a recessive phenotype (this is complete dominance). A man who is susceptible to poison ivy and who has the blood genotype AO marries a woman who is heterozygous for poison ivy sensitivity and who has type O blood.
2. Find the genotypic ratio of their offspring.  
   **25% IiAO; 25% IiOO; 25% iiAO; 25% iiOO**
3. Find the phenotypic ratio of their offspring.  
   **25% immune/type A; 25% immune/type O; 25% susceptible/type A; 25% susceptible/type O**
4. In cats, crossing a black cat with a tan cat results in a phenotype called “tabby:” black and tan striped.  
   A) Is this codominance or incomplete dominance? How can you tell?  
   **Codominance: both alleles are expressed in the heterozygote**  
   B) Find the genotypic ratio of the offspring of two tabby cats.  
   **25% BB, 50% BT, 25% TT**  
   C) Suppose the two tabby cats from part B have a litter of 8 kittens. How many kittens would you expect to be black?  
   **2**
5. In a fictional species of rabbit, fur color is controlled by a single gene and there are three different fur colors: black, white, and gray. To determine which color is dominant, you cross a black rabbit with a white rabbit. All of the F1 are gray.  
   A) Is this codominance or incomplete dominance? How can you tell?  
   **Incomplete dominance: the heterozygotes have an intermediate phenotype that is different from either homozygote**  
   B) What is the genotype of the F1?  
   **BW**  
   C) You summarize your findings to a friend of yours, who claims that the traits in offspring are always just a “mix” of the parents’ traits. What could you do to convince your friend that this is not how inheritance works?

**The easiest answer is to just cross 2 gray rabbits. That cross will not produce all gray rabbits; you’ll get about ¼ black and about ¼ white rabbits.**