Complex Inheritance Practice Problems

1. What are the phenotypic ratios that can be expected from each of the following crosses?

   a. $I^Ai \times I^BI^B$
   b. $I^AI^B \times I^Bi$
   c. $ii \times I^AI^B$
   d. $I^Ai \times I^Bi$
   e. $I^AI^B \times I^AI^B$

2. A man with blood type A, one of whose parent was blood type O, married a woman with blood type AB. What chance would one of their children have of having blood type AB? What is the chance that any one of their children would have blood type A?

3. How many kinds of crosses can produce type O blood?

4. What are the genotypes of parents who have type A and type B blood but who have all four blood types represented in their children?

5. Match up the correct child with his/her parents, assuming no more than one child can be with any one couple.

Child #1: type O		Parents A: type AB and O
Child #2: type AB		Parents B: types A
Child #3: type A		Parents C: Types AB and B

6. A woman has type O blood. Her boyfriend has type A blood. She is bringing him to court on a paternity suit because he is the father of her child who has type O blood. He argues that he is not the father, however. Could she win the case on these grounds? Why or why not? What information could she gather to try to increase her chances of winning the suit?

7. Some flies can have either vertical stripes, horizontal stripes or both (plaid).
   a. Show the expected offspring of a cross between a vertically striped fly and a plaid fly. (Use the letters V and H.)
   b. What type of inheritance does this demonstrate – sex-linked, incomplete dominance, codominance, or multiple alleles?

8. Raccoons have stripes on their tails - wide, narrow, and medium.
   a. What is the phenotypic ratio if a medium-striped raccoon mates with another medium-striped raccoon? (Use the letter W_1 and W_2.)
   b. What type of inheritance does this demonstrate – sex-linked, incomplete dominance, codominance, or multiple alleles?
9. In a family of four, 1 child has curly hair, 1 child has straight hair, and 2 children have wavy hair. Show what the genotypes of the parents would have to be.

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10. Cattle can have either red hair, white hair, or be roan (have both red and white hair).
    a. A roan bull (red and white hairs) is mated with a red-haired cow. Show the genotypes of the parents and the possible genotypes and phenotypes of their offspring.
    b. If a farmer wanted cows with only white-hair (no red or roan), what genotypes would the parents have to be?

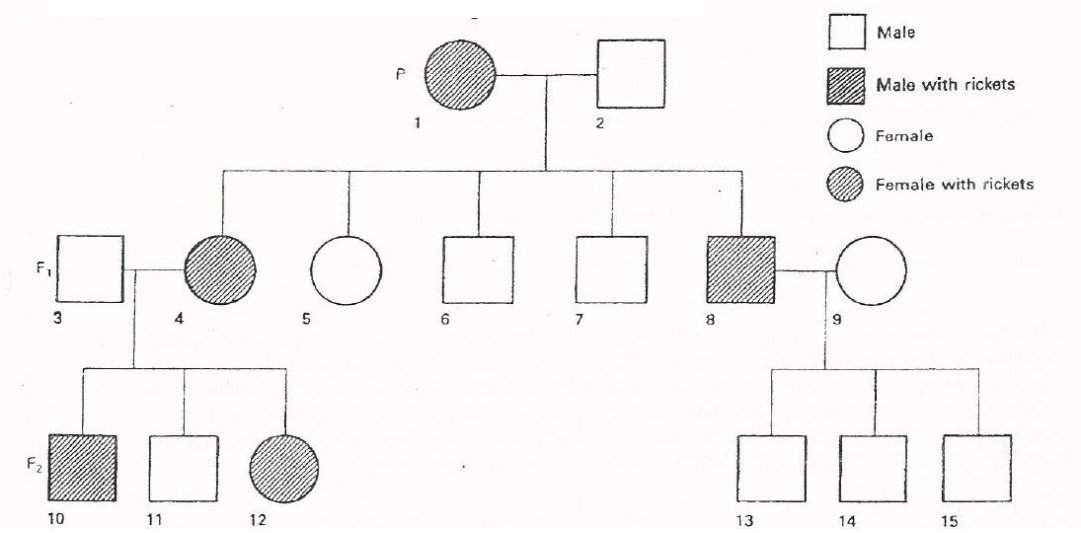
11. A cross between a blue blahblah bird & a white blahblah bird produces offspring that are silver. The color of blahblah birds is determined by just two alleles.
    a. What are the genotypes of the parent blahblah birds in the original cross?
    b. What is/are the genotype(s) of the silver offspring?
    c. What would be the phenotypic ratios of offspring produced by two silver blahblah birds?

12. The color of fruit for plant "X" is determined by two alleles. When two plants with orange fruits are crossed the following phenotypic ratios are present in the offspring: 25% red fruit, 50% orange fruit, 25% yellow fruit. What are the genotypes of the parent orange-fruited plants?

13. What type of inheritance pattern do #5 and 6 illustrate – codominance or incomplete dominance?

14. A cross between a black cat & a tan cat produces a tabby pattern (black & tan fur together).
    a. What pattern of inheritance does this illustrate?
    b. What percent of kittens would have tan fur if a tabby cat is crossed with a black cat?

15. Rickets is a condition in which bones are too soft. Children with rickets develop deformed bones. One form of rickets is caused by a dominant allele on the X chromosome. The pedigree below traces this condition in a family.



    a. What is the genotype of the P female?
    b. Individual 8 has rickets, yet none of his three sons have the condition. Why?
    c. What is the genotype of individual 4?

16. Very few human alleles are carried on both the X and the Y chromosome, but there are a few. One is the dominant allele that codes for hair on the outer ear's rim. Identify the possible genotypes and phenotypes of the offspring from a dad heterozygous for hairy ears (X^hY^H) and a woman homozygous for ears that are not hairy.