Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Interpreting and Constructing A Human Pedigree

**Background Information**

Human traits are often difficult to study for several reasons. Unlike some organisms which produce large numbers of offspring very quickly, humans reproduce slowly and produce few offspring at one time. One way to study human inheritance is through pedigree analysis. A pedigree is a diagram that shows the phenotype of a particular genetic trait in a family from one generation to the next. Genotypes for individuals in a pedigree often can be determined.

**Procedure:**

**Part A: Interpreting a Pedigree Chart**

1. Figure 1 is a pedigree, or a diagram of a family’s pattern of inheritance for a specific trait.

I

II

III

1. Notice that in a pedigree, each person is represented by an Arabic number and each generation is represented by a Roman numeral. In this way, each person can be identified. Males are represented by squares and females by circles. Unshaded symbols (squares or circles) indicate people who are homozygous or heterozygous for the dominant trait. Shaded symbols indicate people who are homozygous for the recessive trait.
2. In Figure 1, I-1 and I-2 are the parents. The horizontal line that connects them indicates that they had children together. The vertical line that extends down from this line connects children to their parents. Children are listed in order of birth from left to right.
3. The trait being analyzed in Figure 1 is ear-lobe shape. The gene for free ear lobes(E) is dominant over a gene for attached ear lobes(e). **Use Figure 1 to complete questions 1-8**

**Questions:**

1. What is the genotype of I-2?
2. What are the genotypes of II-1, II-2, II-3, and II-4? Explain your answer.
3. What are the possible genotypes for II-6? Explain your answer.
4. If II-6 is EE, what is the genotype of her child with II-5?
5. What sex is the oldest child in generation II?
6. Who is the youngest child in generation II?
7. Who is the daughter-in-law in this family?
8. How many generations are represented in this pedigree?

**Part B: Constructing a Family Pedigree**

1. In the space provided below, sketch the outline of a pedigree of your family, including all 10 people from your family trait list. (Or the other family you have chosen to diagram). Have Mrs Schneider check and initial your sketch before you begin a final version on a separate sheet of paper.
2. On your final pedigree **on a separate sheet of paper** use your trait list to write all the known alleles on the stickers for each of your 10 individuals. Use a blank (\_\_) for any unknown alleles. Also remember to title your pedigree and put Roman and Arabic numbers to label the individuals. Add those individual numbers to your Trait list so it is clear which individuals are which on your pedigree.
3. Mark each of the homozygous recessive traits with a colored dot. Make a key on your pedigree for which color represents which homozygous recessive genotype.
4. Then looking at the parents and children of the individuals homozygous recessive for a trait, fill in any blanks that can be determined through pedigree analysis. Do not fill in blanks if you cannot determine that allele.

**Questions:**

1. Would you expect other students in your class to have pedigrees that are identical to yours? Explain.
2. Explain why you are not always able to determine the exact genotype for a trait of a person when you construct a pedigree.
3. If two parents are unable to roll their tongues, is it likely that they will have children who will be able to roll their tongues? Explain.
4. A woman received the genes aBcD from her mother and AbCd from her father. Which of the following gene combinations could be present in her gametes: ABCD, abcd, ABCDD, aBccD, ABcd, AaBb? Explain
5. If the inheritance pattern of the attached earlobe phenotype in your pedigree represented a genetic disorder that led to death in childhood, how would this disorder have affected your family?
6. Pick one individual in your pedigree who has not yet had children and explain what information you could share with them about the chances of having children with this disorder.
7. Complete the pedigree in the figure below. In the spaces below each symbol, write as much of the genotype of each individual as can be determined from the information provided. Assume the shaded symbols represent the homozygous recessive genotype rr.

I

II

III