

A line perpendicular to a marriage line indicates the offspring. If the line ends with either a circle or square, the couple had only one child. However, if the line is connected to another horizontal line, then several children were produced, each indicated by a short vertical line connected to the horizontal line. The first child appears to the left and the last child to the right.

4) How many children did the first couple have?

Generation B represents the second generation. Generation C represents the third generation, and so on.

5) How many generations are represented in this pedigree?

The genotypes of the males in a pedigree for hemophilia are easy to determine, since normal blood clotting (N) is dominant and hemophilia is recessive (n). Since these alleles are on the X chromosome only, a male represented by a clear square will have the genotype denoted by $X^N Y$. One represented by a darkened square will be $X^n Y$.

6) How many males have the genotype $X^N Y$?

Females who have hemophilia have an easy genotype to identify. They are $X^n X^n$. Both recessive alleles must be present for a female to have hemophilia. If one dominant allele (X^N) is present, the individual must be normal for clotting. Label all the females with hemophilia as genotype $X^n X^n$ on the pedigree.

7) How many women have genotype $X^N X^n$ in this pedigree?

Females who do not show the trait for hemophilia may be homozygous dominant ($X^N X^N$) or heterozygous ($X^N X^n$). A heterozygous female is called a carrier. Examination of traits among the offspring can often determine which genotype the parents have. If any child (son or daughter) has hemophilia, then the female must be heterozygous ($X^N X^n$). If her son has hemophilia, he has genotype $X^n Y$. He inherited the Y from the father, so the other allele in his genotype (X^n) had to come from the mother. If a daughter has hemophilia ($X^n X^n$), she inherited an X^n from each parent, thus making the genotype of the normal mother $X^N X^n$. Label all females $x^N X^n$ who have children with hemophilia.

8) What is the genotype of the female in the first generation?

A female who has more than four sons, with none exhibiting hemophilia, is likely to have a genotype $X^N X^N$. If she has four or fewer sons, her genotype is less certain. In such cases, her genotype is labeled as $X^N X^?$. Label the rest of the females in the pedigree as $X^N X^?$ or $X^N X^N$.

10) How many females in the pedigree have the genotype $X^N X^N$?

11) Label the genotype of all people represented in the pedigree for Figure 1.

12) ~~Label the genotype of the individuals in the second pedigree Figure 2.~~