Building a Pedigree Activity

A pedigree is a diagram that shows how organisms are related and also traces the occurrence of a particular trait or characteristic for several generations. The genetic makeup of individuals in the pedigree might be determined if one understands the laws of heredity and probability.

Observe the symbols and the example of the pedigree below:

Male without trait	Male with trait	
Female without trait	Female with trait	
Male, Died in infancy	Identical twins	
Female, Died in infancy		

Pedigree showing blue-eyed trait:



Generation I represents the parents

Generation II represents the parent's children and a son-in-law

Generation III represents the male grandchild

Colored-in symbols have the genotype bb

Non colored-in symbols have at least one B allele

The second allele of the brown-eyed people in the pedigree might be able to be determined from their parents of children

Make a pedigree for left-handedness using information of the Thomas family:

The father, Tom, and mother, Diane, have three children. The two oldest children are Anna and Mary and the youngest child is Teddy. The oldest daughter, Anna, is married and has an older son, Will, and younger daughter, Vanessa. Mary is also married and has a son, Patrick. Teddy is not yet married. Everyone in this family is right handed except the father, the oldest daughter, and the granddaughter. Right-handedness is dominant.

Pedigree 1: An individual with albinism lacks an enzyme needed to form the skin pigment melanin. This condition is controlled by a recessive allele. Use DD to represent the allele for normal skin and dd to represent the genotype for albinism. Fill in the genotypes below each individual in the pedigree below.



If individuals 1 & 2 in generation II were to have another child, what is the chance the next child will be normal?

Pedigree 2: Hemophilia is a sex-linked genetic disease caused by recessive allele (X^h) which doesn't allow the blood to clot. Female hemophiliacs are homozygous recessive, but carrier females have only one allele and their blood clots normally. List the genotypes of each individual in the pedigree below.



If individual 2 in generation III were to marry a woman that was normal for blood clotting, $X^{H}X^{H}$ what is the chance that their first child will be a hemophiliac?

Pedigree 3: Rickets in a condition in which the bones are soft. Children with rickets develop deformed bones. A lack of vitamin D, calcium, and phosphorous in the diet usually causes this condition. Rickets is caused by a dominant allele on the X chromosome. Determine the genotypes for the individuals in the pedigree below.



If individual 1 in generation I had the same phenotype as his wife, what are the chances that each of their children would have rickets?

Pedigree 4: Use A to represent the allele for the ability to taste PTC, a dominant allele. Use aa for the PTC nontaster, who exhibits the recessive trait. Use A- where the genotype is uncertain. List the genotypes for each individual.



If individual 4 in generation I had married individual 4 in generation III, what is the probability that each of their children will be a taster?

Draw a pedigree chart for the following scenarios:

1. A woman's sister has cystic fibrosis, a disease caused by recessive genes. Neither of her parents has the disease. What chance is there that her mother is a carrier (heterozygous) for the trait? What chance is there that the woman herself is a carrier for the trait?

2. Huntington's disease is a degenerative disease of the nervous system which does not show up until age 40. It is caused by a dominant gene. John's father just began to show the symptoms. What is the chance that John will have the disease?

3. The pedigree below shows the blood types of some individuals. List all of the possible genotypes of the individuals and determine the blood group AND genotype of the missing blood groups.

