

Independent Assortment

IA1) An individual's genotype is: AaBb

(A and B represent two different genes, but upper and lower case A represent different alleles of the A gene, and upper and lower case B represent different alleles of the B gene).

How many unique gametes could be produced through independent assortment by an individual with the above genotype?

_____ 4

List them all: *AB, Ab, aB, ab*

IA2) How many unique gametes could be produced through independent assortment by an individual with the genotype

AaBbCCDd? 8

List them all: *ABCD, ABCd, AbCD, AbCd, aBCD, aBCd, abCD, abCd*

Monohybrid Cross A

MC1) In a certain plant species, the dominant allele R causes the plants to have rough leaves and the recessive allele r causes the plants to have smooth leaves. A plant that is genotype Rr is crossed with a plant that is genotype rr. What phenotypes of offspring (and in what percentages) do you expect from this cross?

50% rough leaves (dominant phenotype)
50% smooth leaves (recessive phenotype)

MC2) Albinism (lack of skin pigmentation) is caused by the recessive allele m. In other words, people who are albino have genotype mm. A normally pigmented man married an albino woman. They have three children, one of whom is an albino. What is the genotype of the father?

Pedigree Analysis

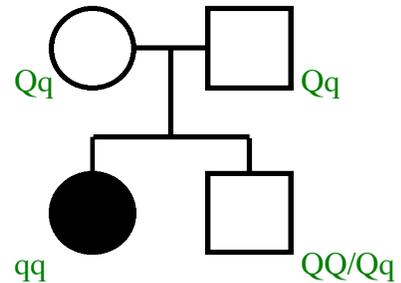
Recessive Traits

Most genetic diseases are recessive. Therefore, when you are analyzing a pedigree chart for a genetic disease, a good starting assumption is that the trait is recessive. Using that assumption, try to assign genotypes to all family members. If you can assign each member a genotype (or genotypes) that is consistent with the laws of genetics, you have shown that it is possible that the trait is recessive.

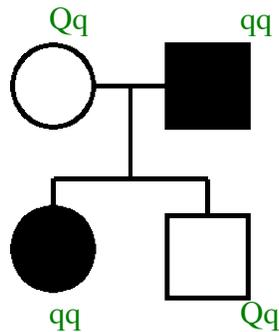
We will determine if the pedigree on the right can be for a trait that is recessive. Use the following designations:

A = Allele for normal

a = Allele for the trait (a genetic disease or abnormality)

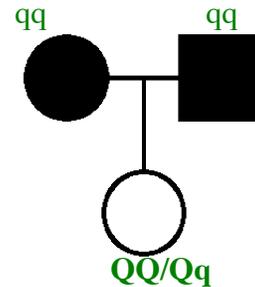


PD1) Assuming that the pedigree above is for a trait that is recessive, try to write the genotype of each individual next to the symbol. Is it possible that the pedigree above is for a recessive trait? _____ *Yes*



PD2) Inspect the pedigree on the left. Assuming that the trait is recessive, try to write the genotype of each individual next to the symbol. Is it possible that the pedigree is for a recessive trait? _____ *Yes*

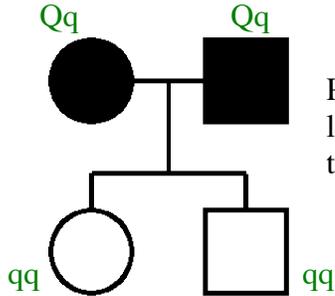
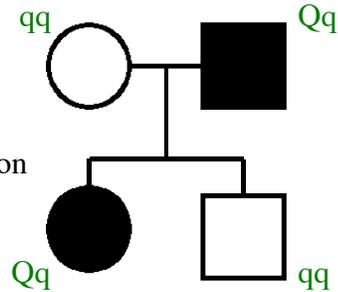
PD3) Assuming that the pedigree to the right is for a trait that is recessive, try to write the genotype of each individual next to the symbol. Is it possible that the pedigree is for a recessive trait? *No.*



Dominant Traits

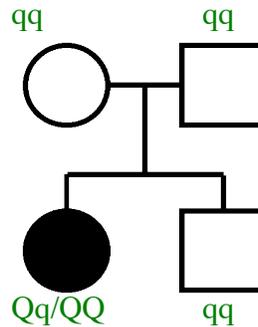
Although most genetic diseases are recessive, some are dominant. Therefore, when you are analyzing a pedigree chart for a genetic disease, you should determine if the pedigree is consistent with a dominant trait and with a recessive trait. To determine if the trait could be dominant, try to assign genotypes to all family members. If you can assign each member a genotype(s) that is consistent with the laws of genetics, you have shown that it is possible that the trait is dominant.

PD4) Write the genotypes next to the symbol for each person in the pedigree on the right, assuming that it is for a dominant trait. Is it possible that is for a dominant trait?
Yes



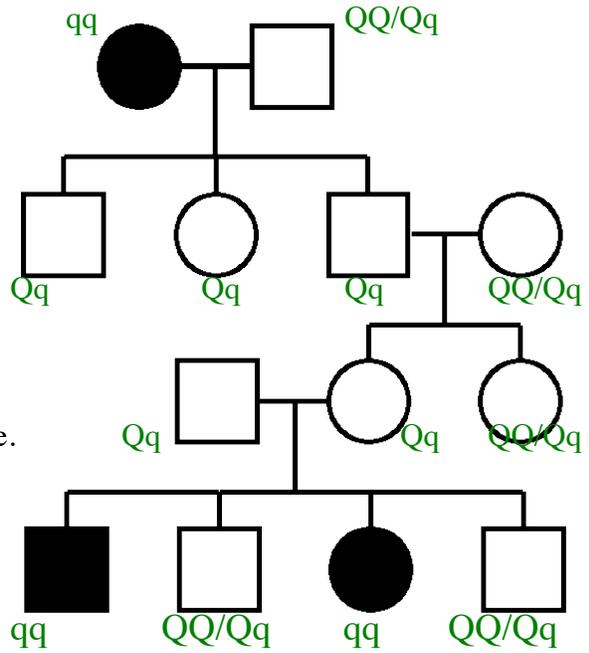
PD5) Write the genotypes of each family member on the left, assuming that the trait is dominant. Is it possible that this pedigree on the left is for a dominant trait? Yes

PD6) For the pedigree on the right, write the genotype of each individual next to the symbol, assuming that the trait is dominant. Is this possible? No



PD7) As a final exercise, inspect the pedigree below and answer the following two questions BEFORE assigning any genotypes.

Can the trait be recessive? *Yes*
 Can the trait be dominant? *No*



PD8) Now write the genotype of each individual next to the symbol in the pedigree. If more than one genotype is possible for an individual, write all possible genotypes.