

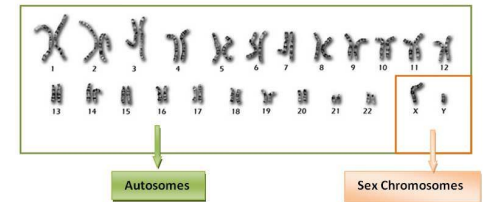
5.3 Pedigrees

Tracking patterns of inheritance

Terms and Meanings

Today's Lesson:

- **Pedigree:** a diagram of an individual's ancestors used in human genetics to analyze the Mendelian inheritance of a certain trait; also used for selectively breeding of plants and animals.
- **Autosomal inheritance:** inheritance of alleles located on autosomal (non-sex) chromosomes.

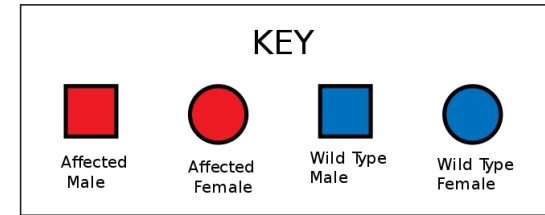
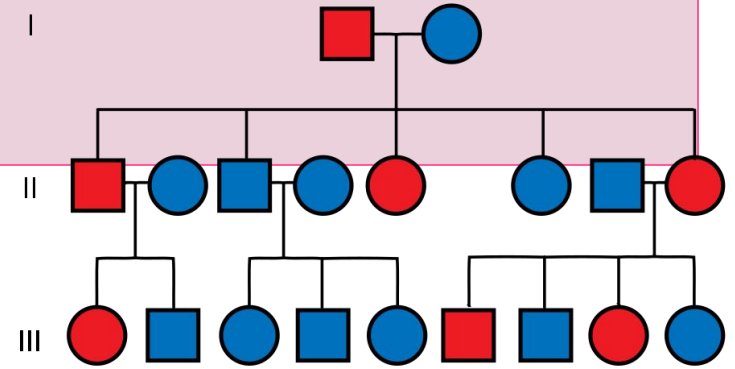


Next Lesson:

- **Sex-linked Inheritance:** describes an allele that is found on one of the sex chromosomes, X or Y, and when passed on to offspring is expressed.
 - X-linked: phenotypic expression of an allele that is found on the X chromosome.
 - Y-linked: phenotypic expression of an allele that is found on the Y chromosome.

Pedigree

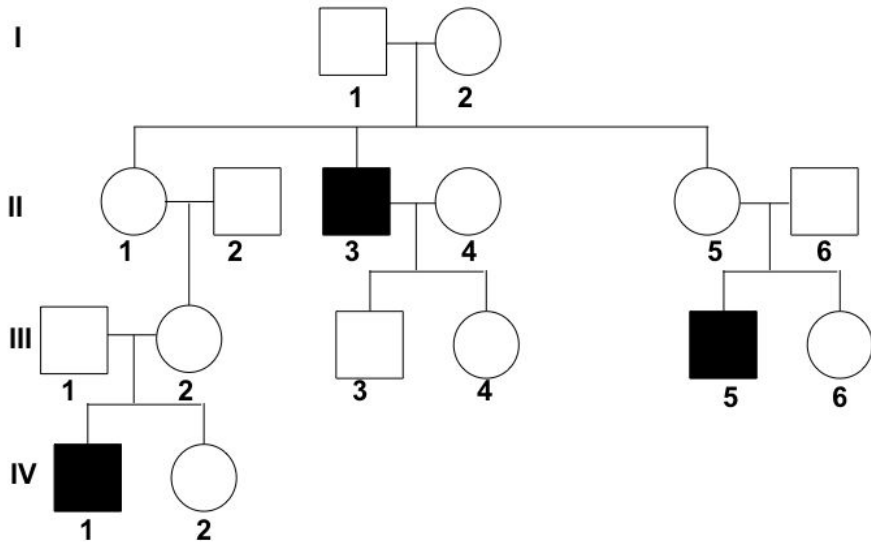
Tracking “bloodlines” can be done using traits other than blood type.



A pedigree: A type of flowchart that uses symbols to show the inheritance patterns of traits in a family over many generations.

- Used to track breast cancer, Huntington’s disease, cystic fibrosis, etc.
- Used in selective breeding of plants and animals.

The Rules



- ☐ **Generations** identified with **Roman numerals**
- ☐ **Birth order** is left to right (oldest to youngest - if possible)
- ☐ **Arabic numbers** for **individuals** in a generation
- ☐ **Affected individual is shaded in**; unaffected is un-shaded.

More Symbols

○ Female

□ Male

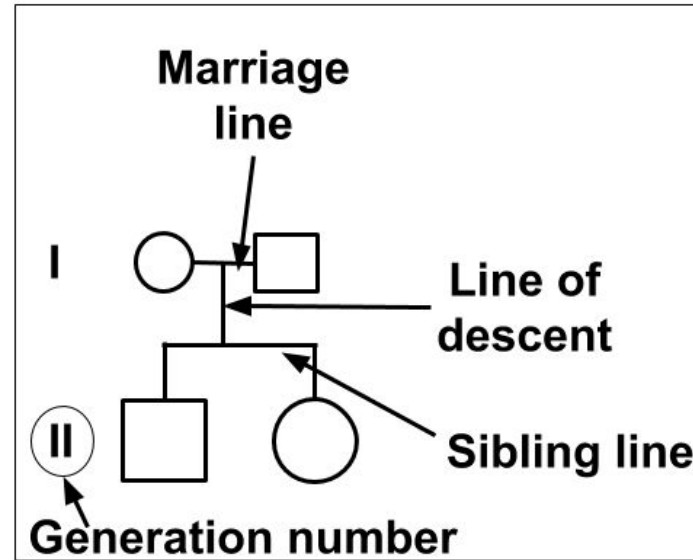
■ Affected with trait

⊘ Deceased

☐☐ Twins

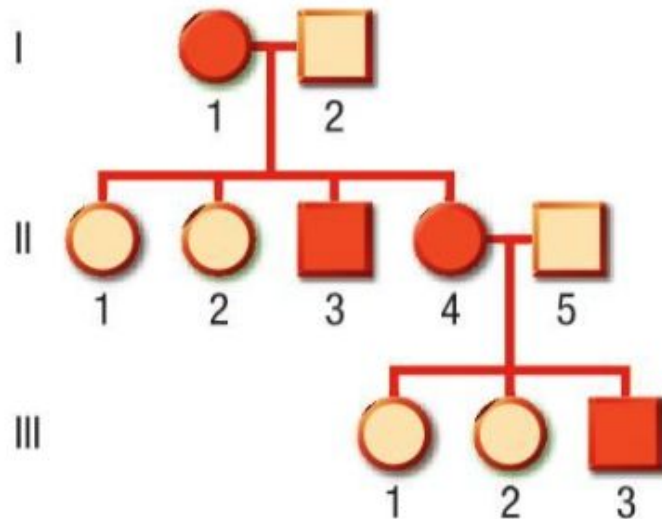
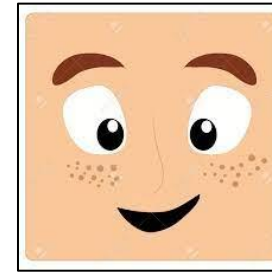
[○] Adopted

△ Miscarriage



Reading a Pedigree Chart

- This pedigree shows the presence of freckles in a family.
 - **Freckles (F) allele is dominant**
 - No freckles (f) is recessive

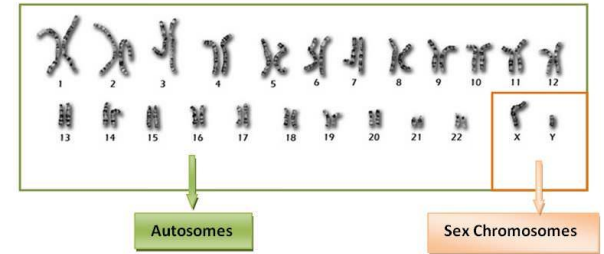


What is the relationship between (II-4) and (II-5)?

Who would be considered the grandmother in this pedigree?

Autosomal Inheritance

Autosomal Inheritance: Inheritance of traits whose genes are found on the *autosomes
*(chromosome sets **1 to 22** in humans)



- **Autosomal dominant inheritance** requires only one copy of the allele for trait for expression
- **Autosomal recessive inheritance** requires both copies of the allele for the trait to be present for expression (individuals are carriers if heterozygous)

You can determine if a trait is autosomal dominant or recessive just by looking at a pedigree chart!

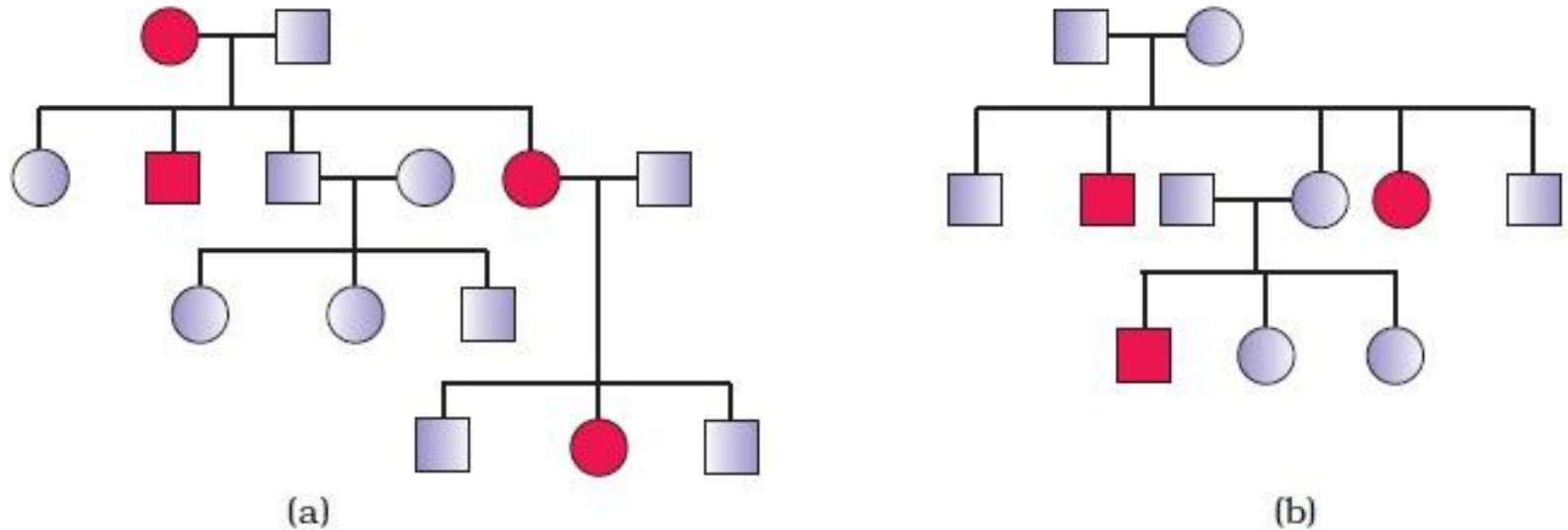
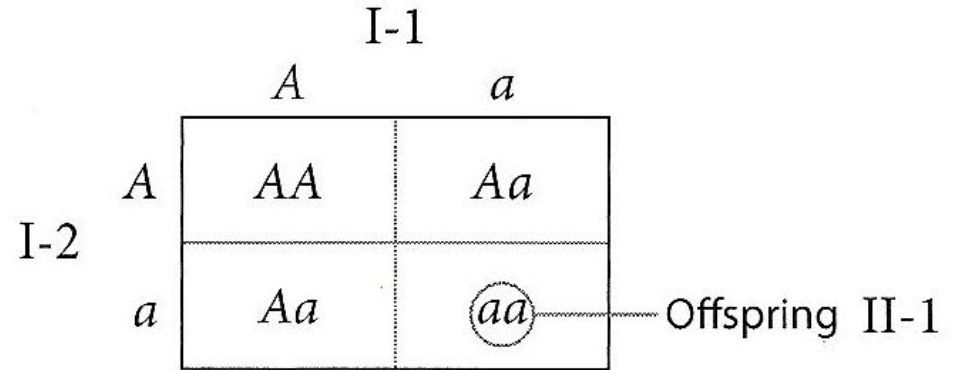
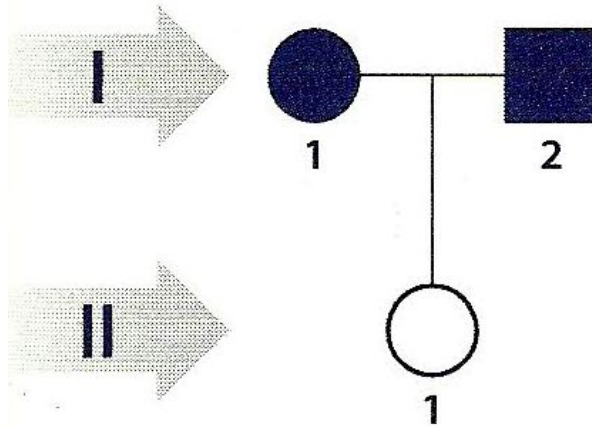


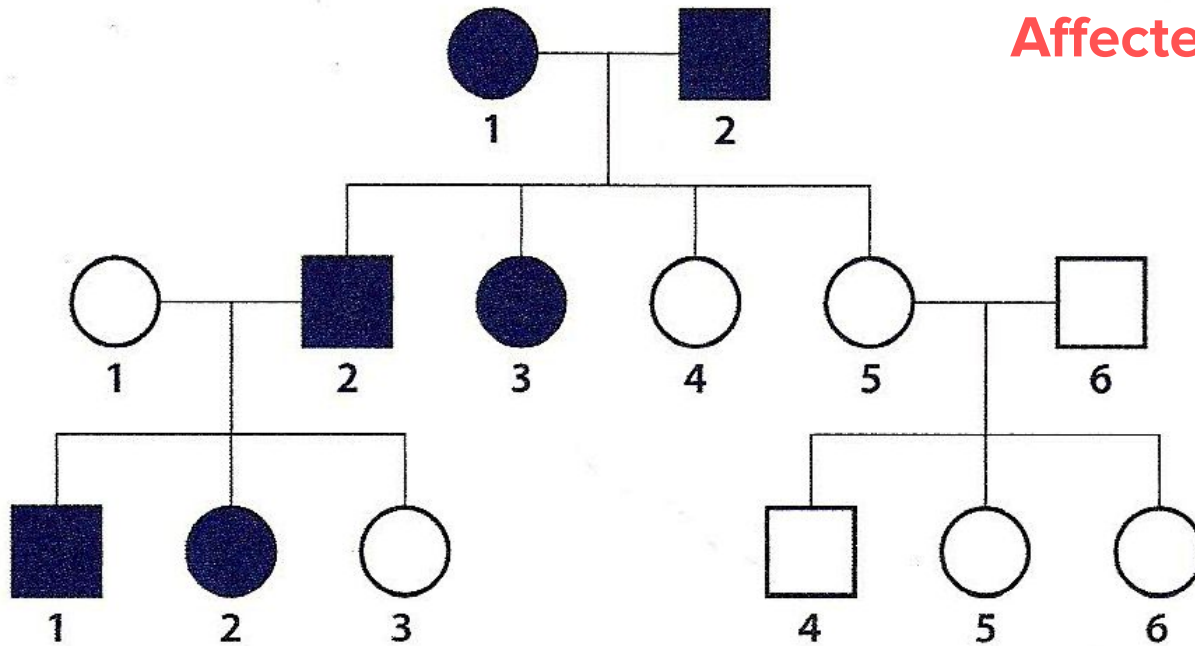
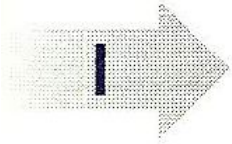
Figure 5.14 Representative pedigree analysis of (a) Autosomal dominant trait (for example: Myotonic dystrophy) (b) Autosomal recessive trait (for example: Sickle-cell anaemia)

Autosomal Dominant Inheritance



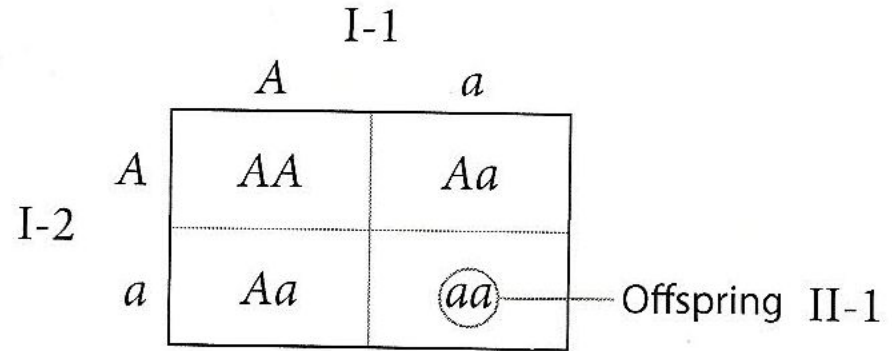
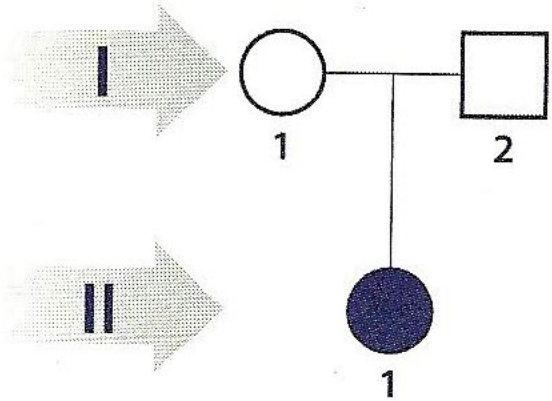
Key
AA = affected
Aa = affected
aa = unaffected

Autosomal Dominant Inheritance Huntington Gene



Affected: HH or Hh

Autosomal Recessive Inheritance

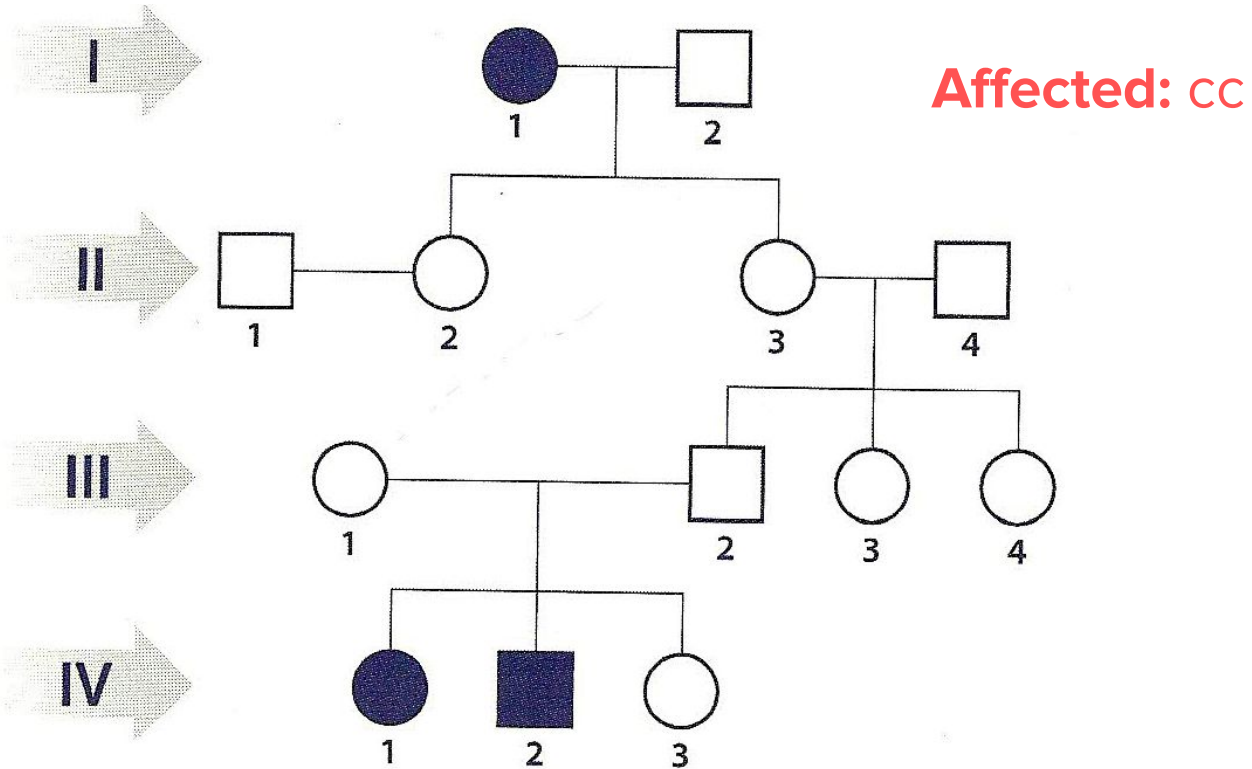


Key

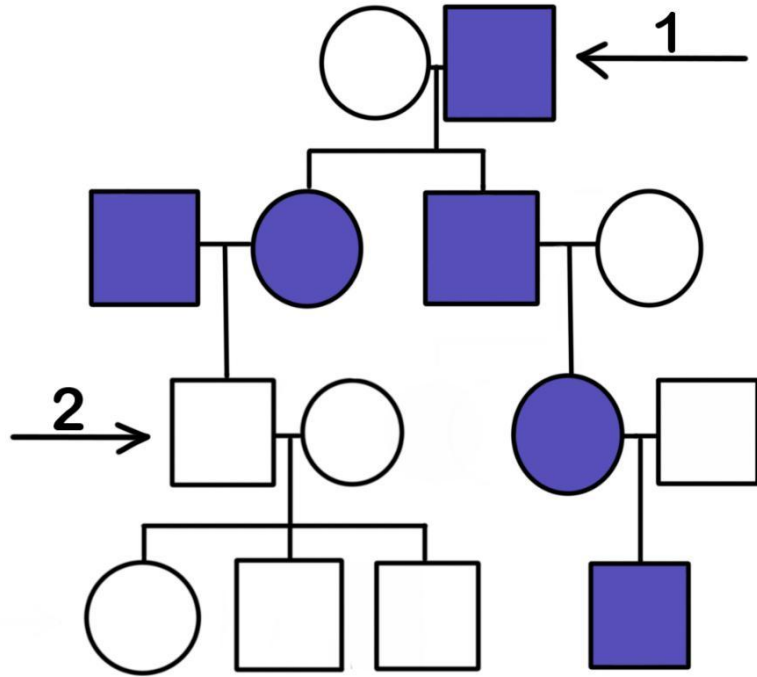
- aa = affected
- Aa = unaffected (carrier)
- AA = unaffected

Autosomal Recessive Inheritance

Cystic Fibrosis

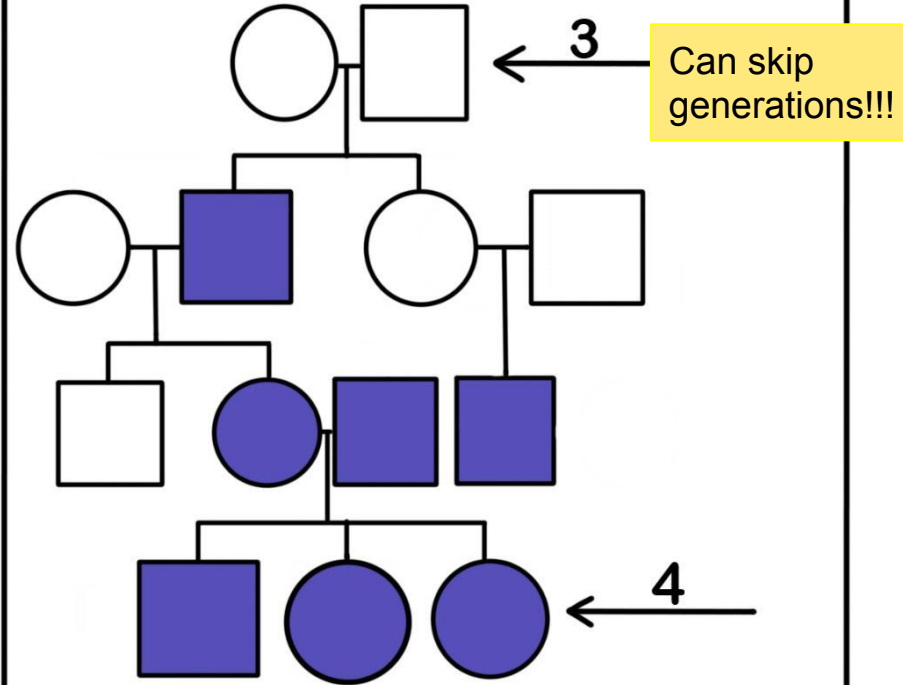


autosomal dominant



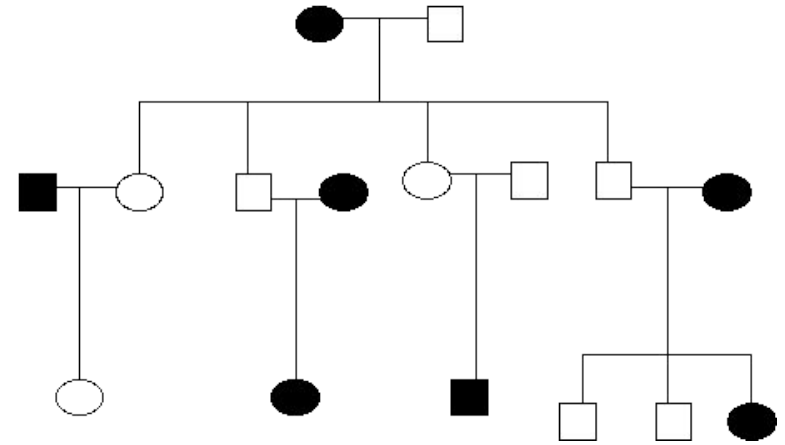
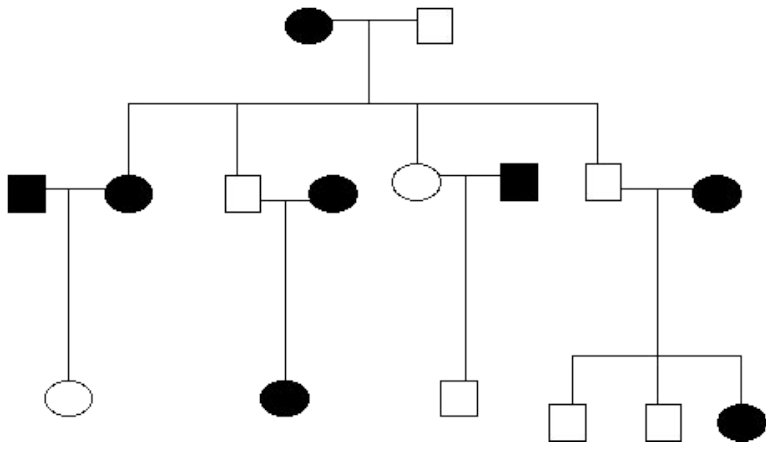
1. Affected children must have at least one affected parent.
2. Two affected parents can have an unaffected child.

autosomal recessive



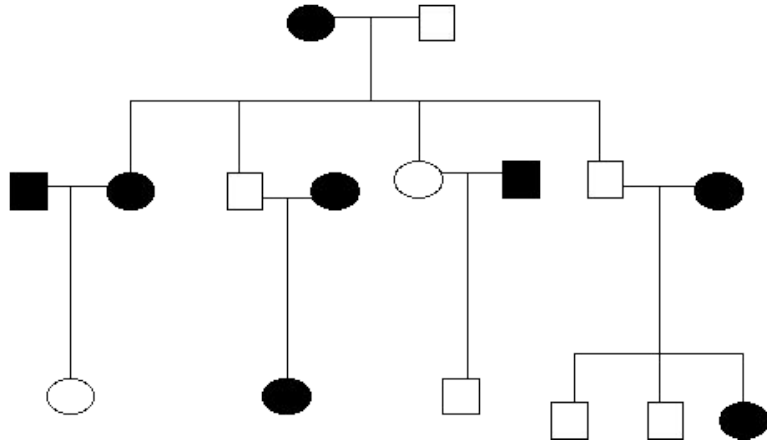
3. Parents don't have to be affected, but both must at least be carriers (heterozygous for the trait).
4. Two affected parents will only have affected children.

Which is Dominant? Which is Recessive?

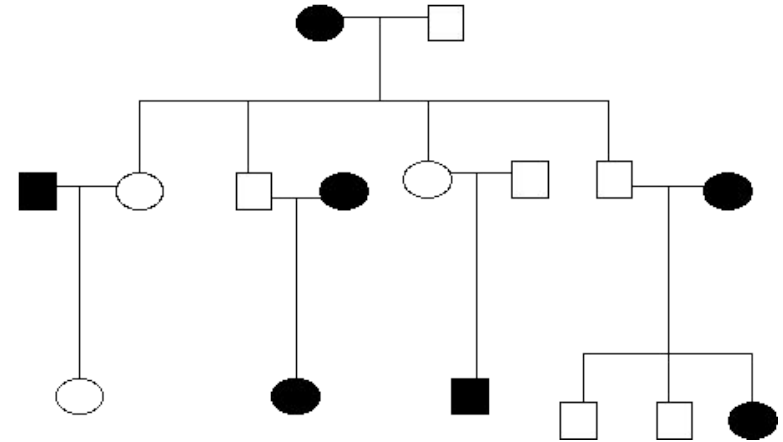


Which is dominant? Which is Recessive?

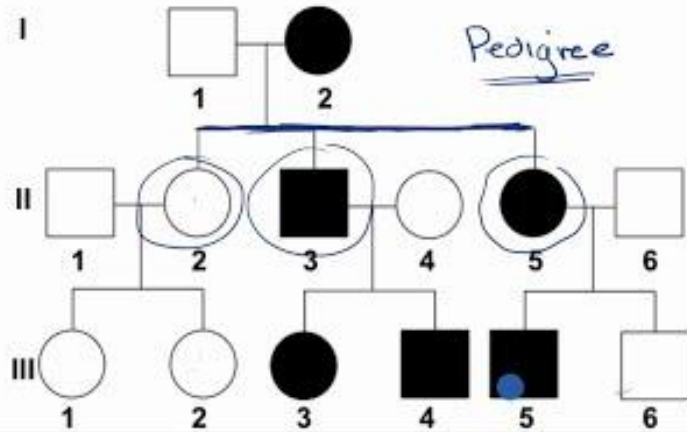
DOMINANT



RECESSIVE



Practice Reading a Pedigree



Class/Homework

Worksheet

Homework pg 201 # 1-5
