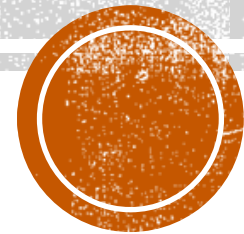


TOPIC 3: PEDIGREES



TOPIC 3 LEARNING TARGETS

- Analyze **pedigrees** to determine the type of inheritance for a trait – dominant, recessive, or sex-linked
- **Create a pedigree** given information about several generations of individuals



NEW GENETICS VOCABULARY

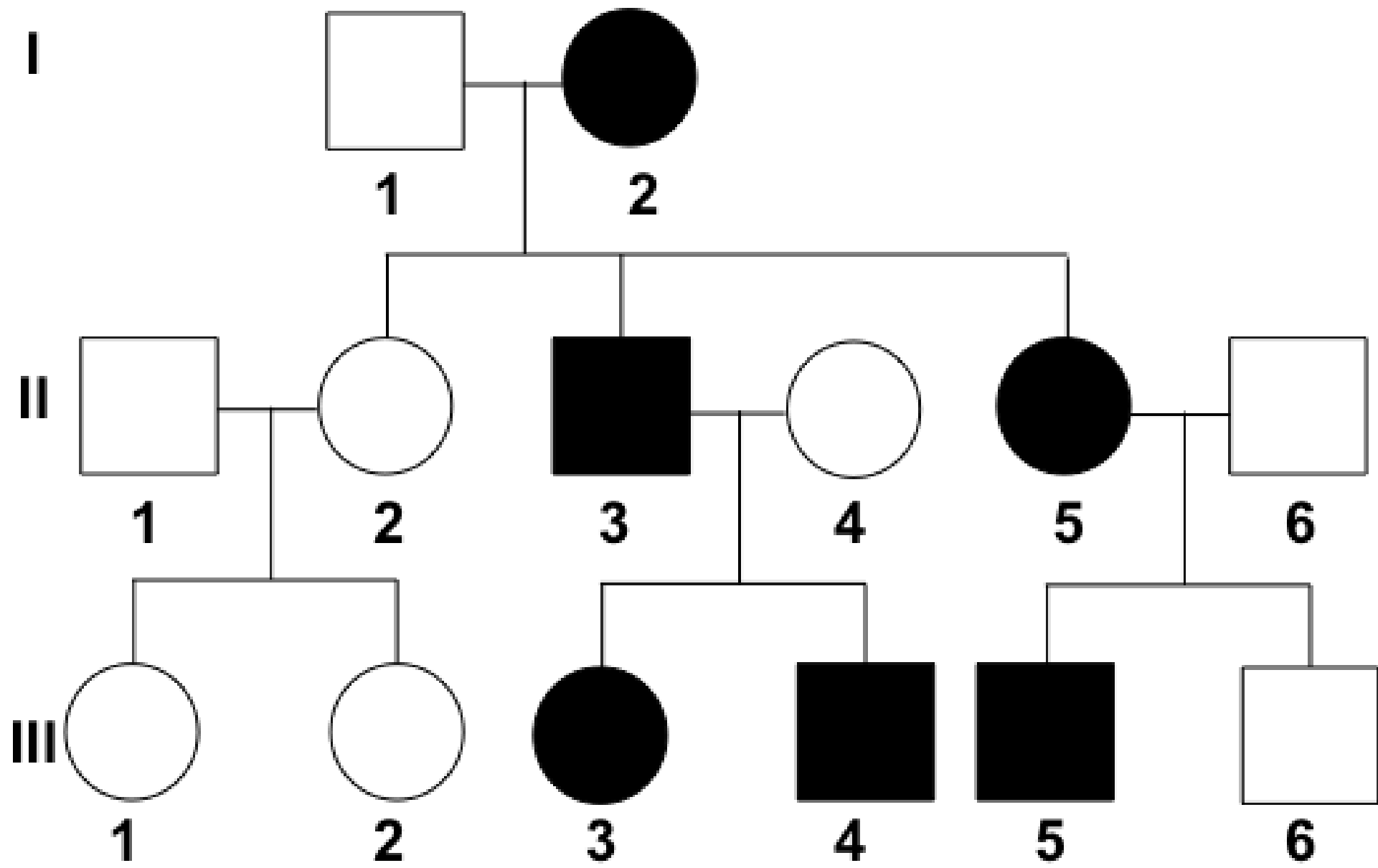
- Pedigree
- Autosomal trait
- Autosomal dominant
- Autosomal recessive
- X-linked dominant
- X-linked recessive
- Y-linked recessive
- Carrier
- Affected
- Unaffected



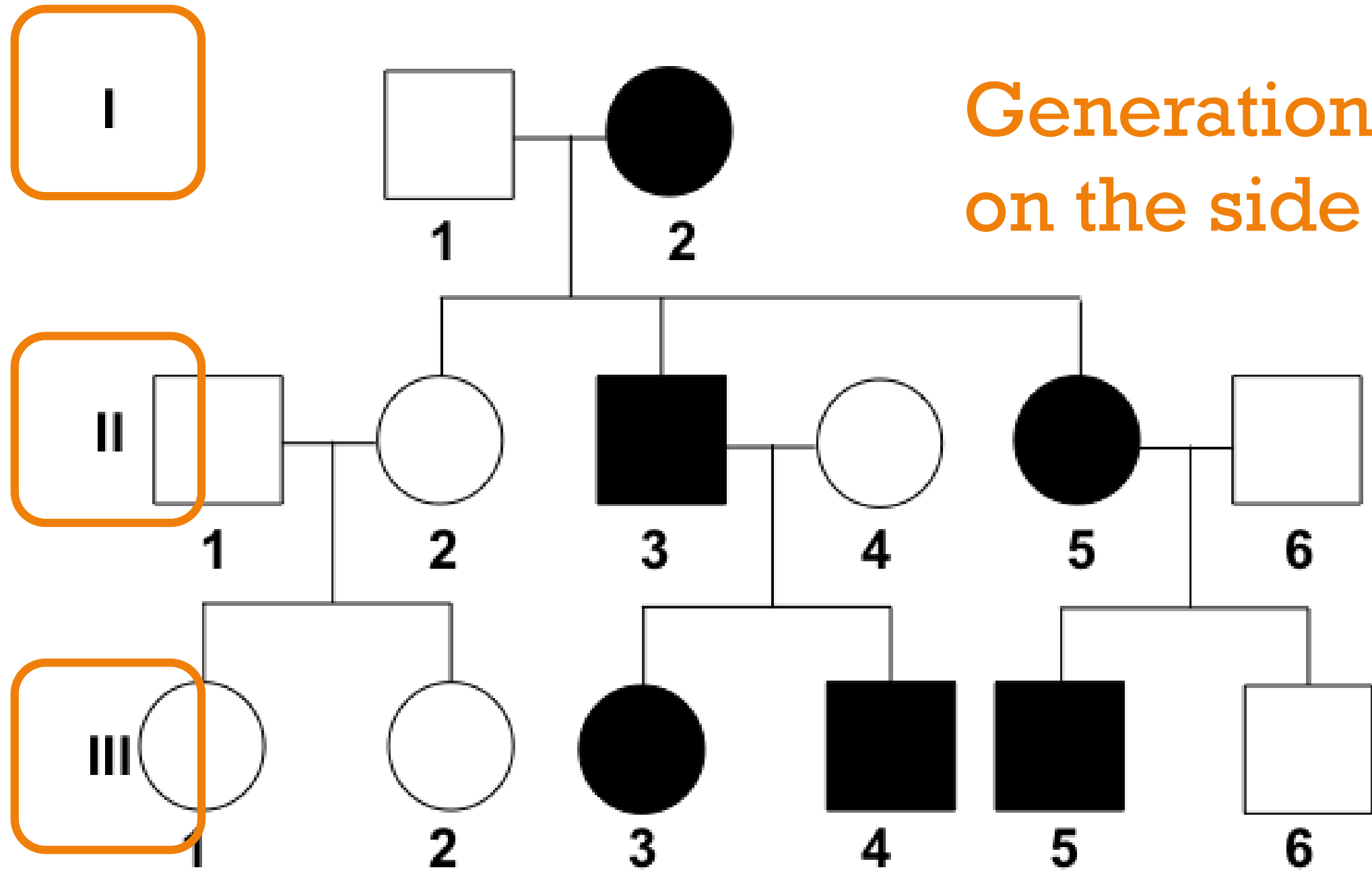
WHAT IS A PEDIGREE?

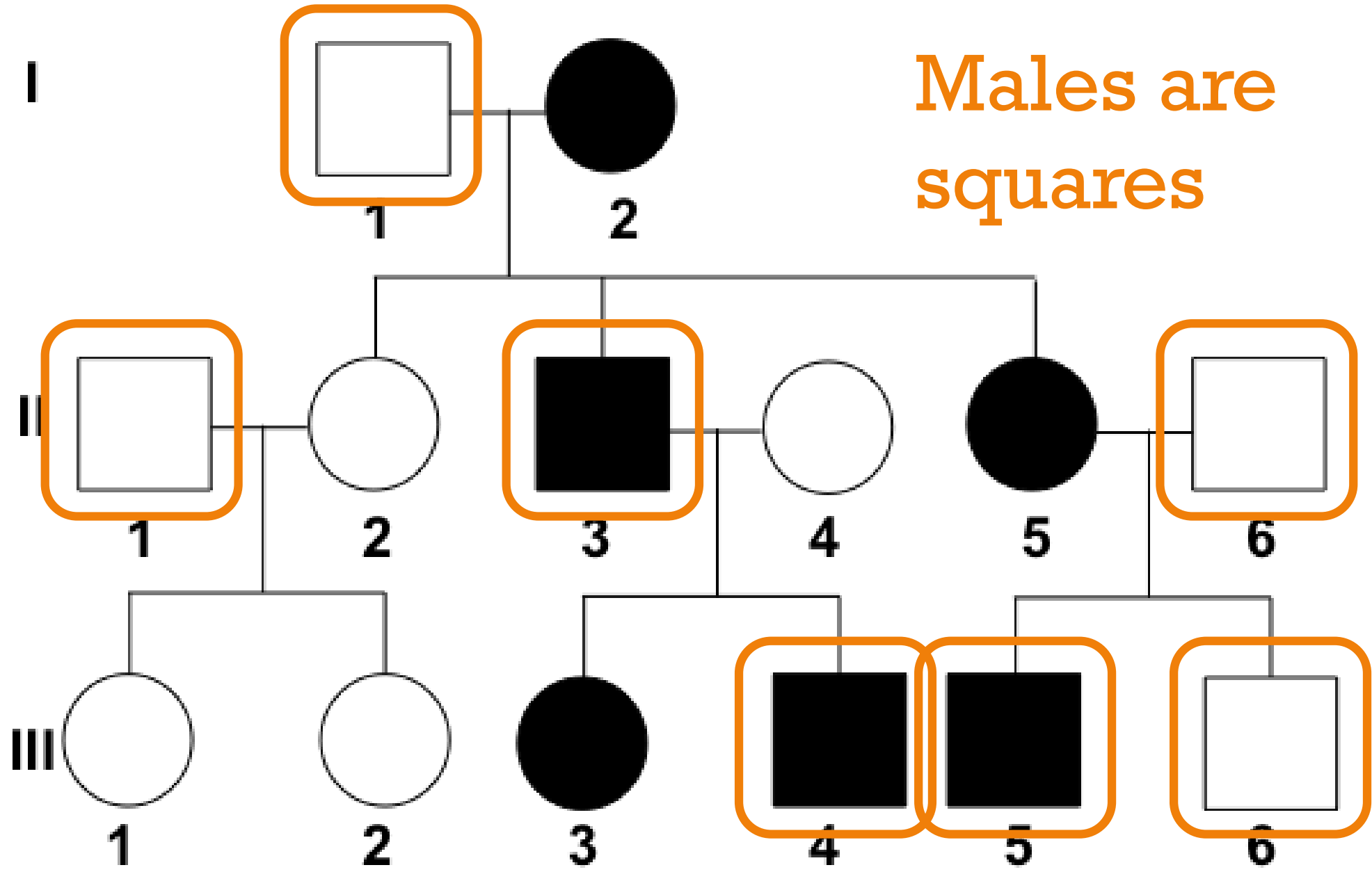
- A tool used to analyze the pattern of inheritance of a particular trait within a family across generations
- Show the presence or absence of a trait as it relates to the relationships among parents, offspring, and siblings

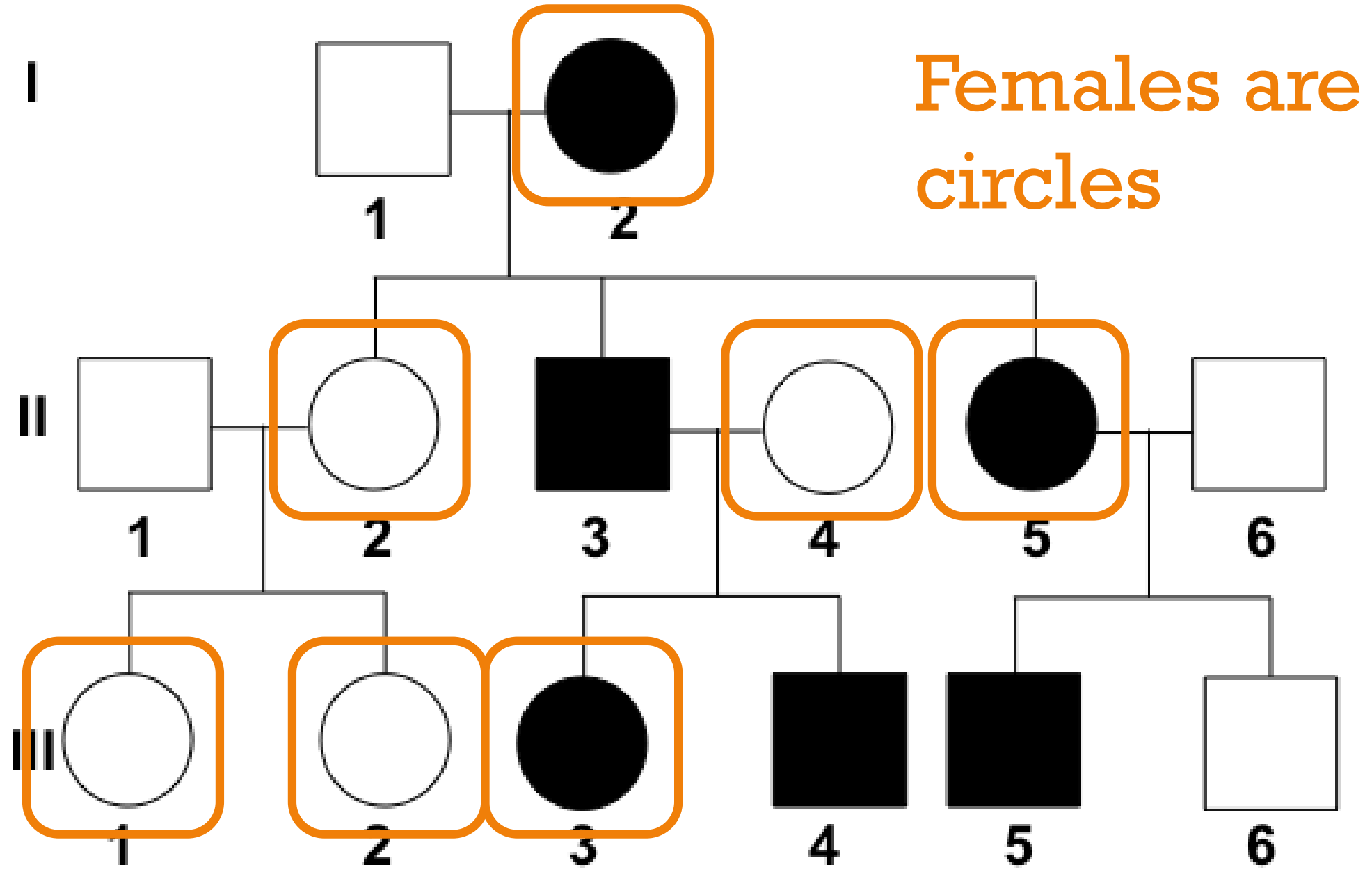


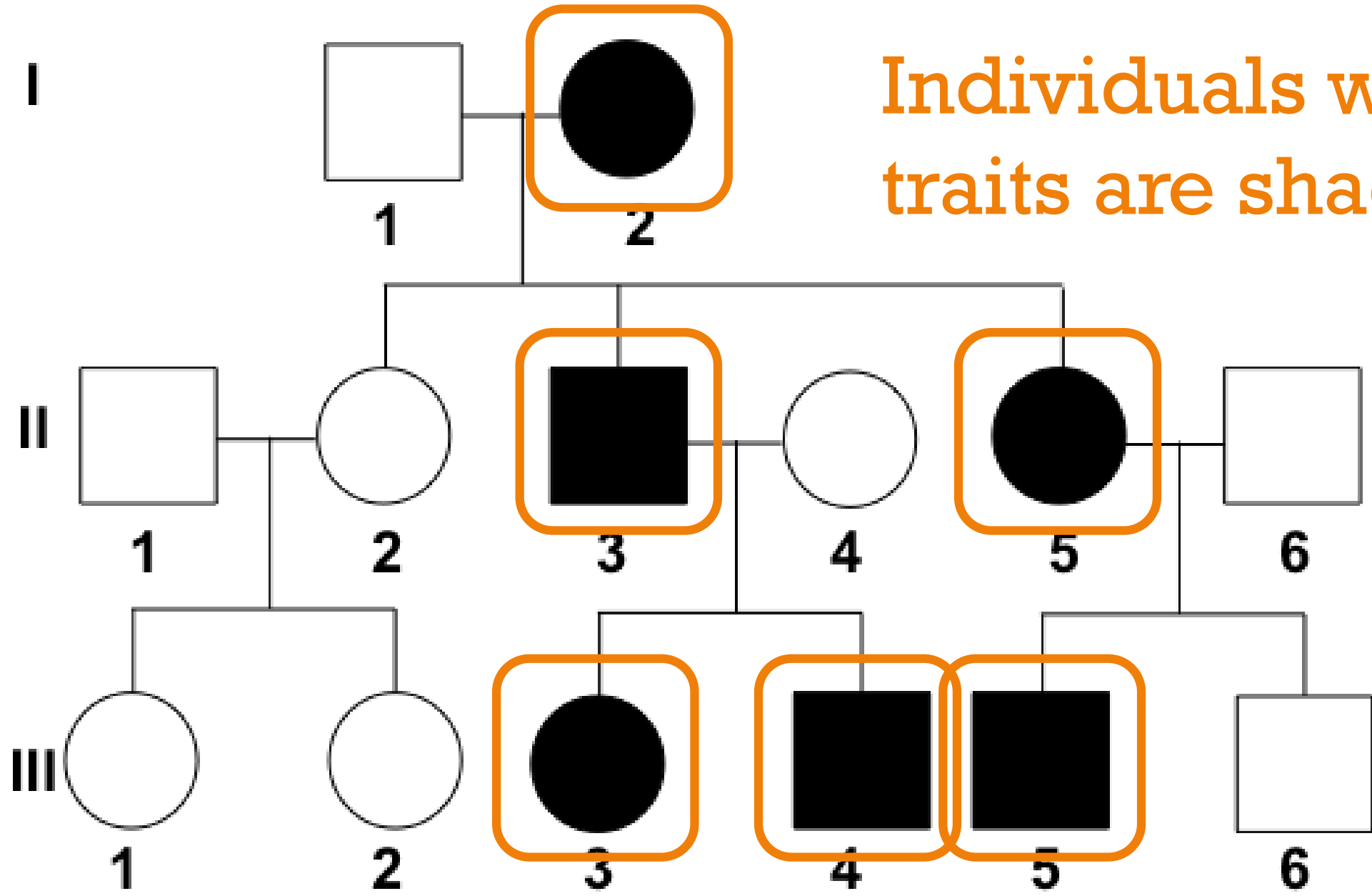


Generations
on the side





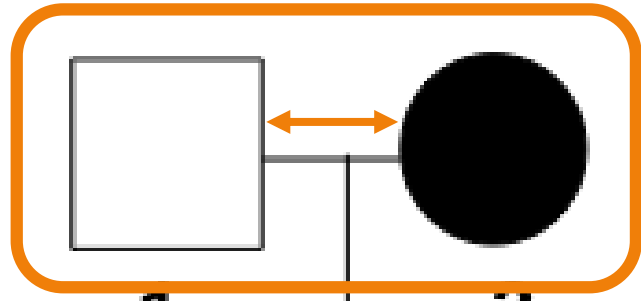




Individuals with traits are shaded



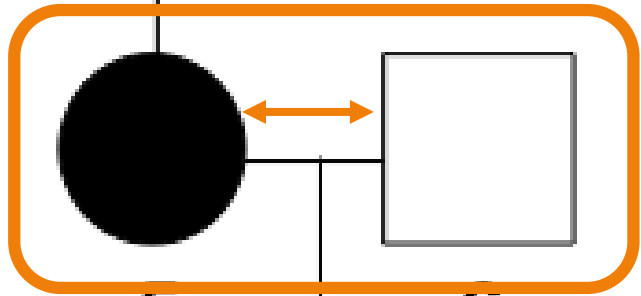
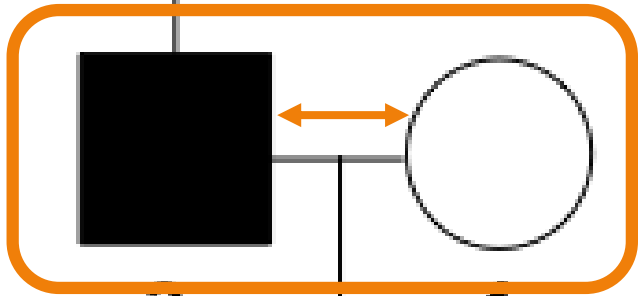
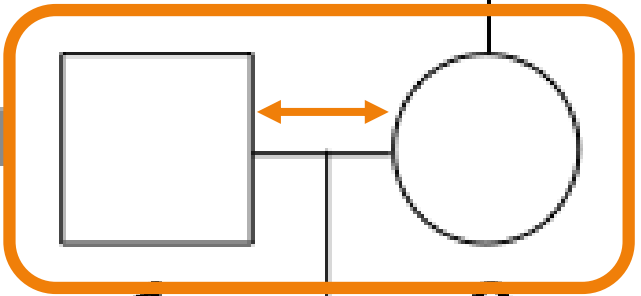
I



Mating pairs are connected horizontally

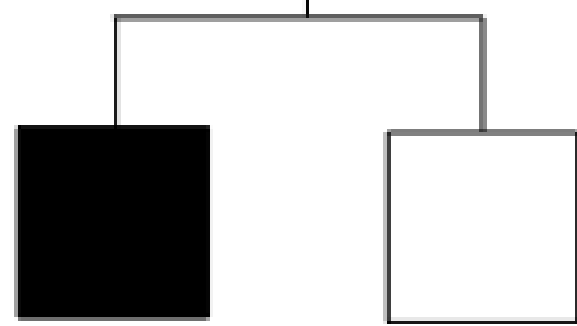
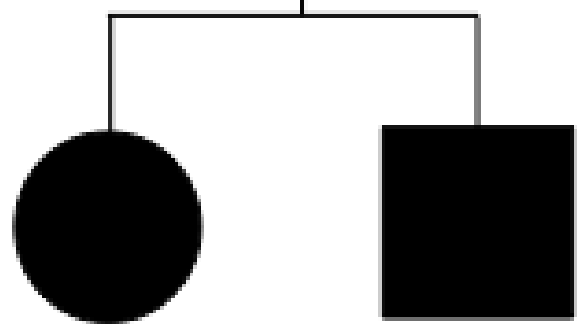
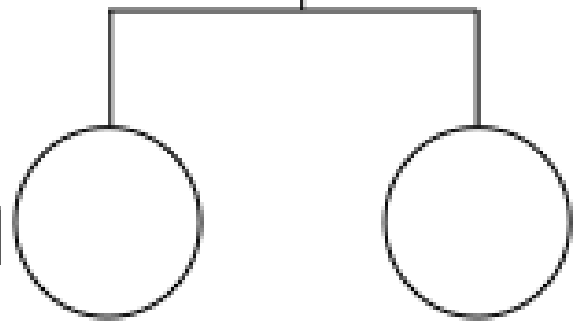
1 2

I



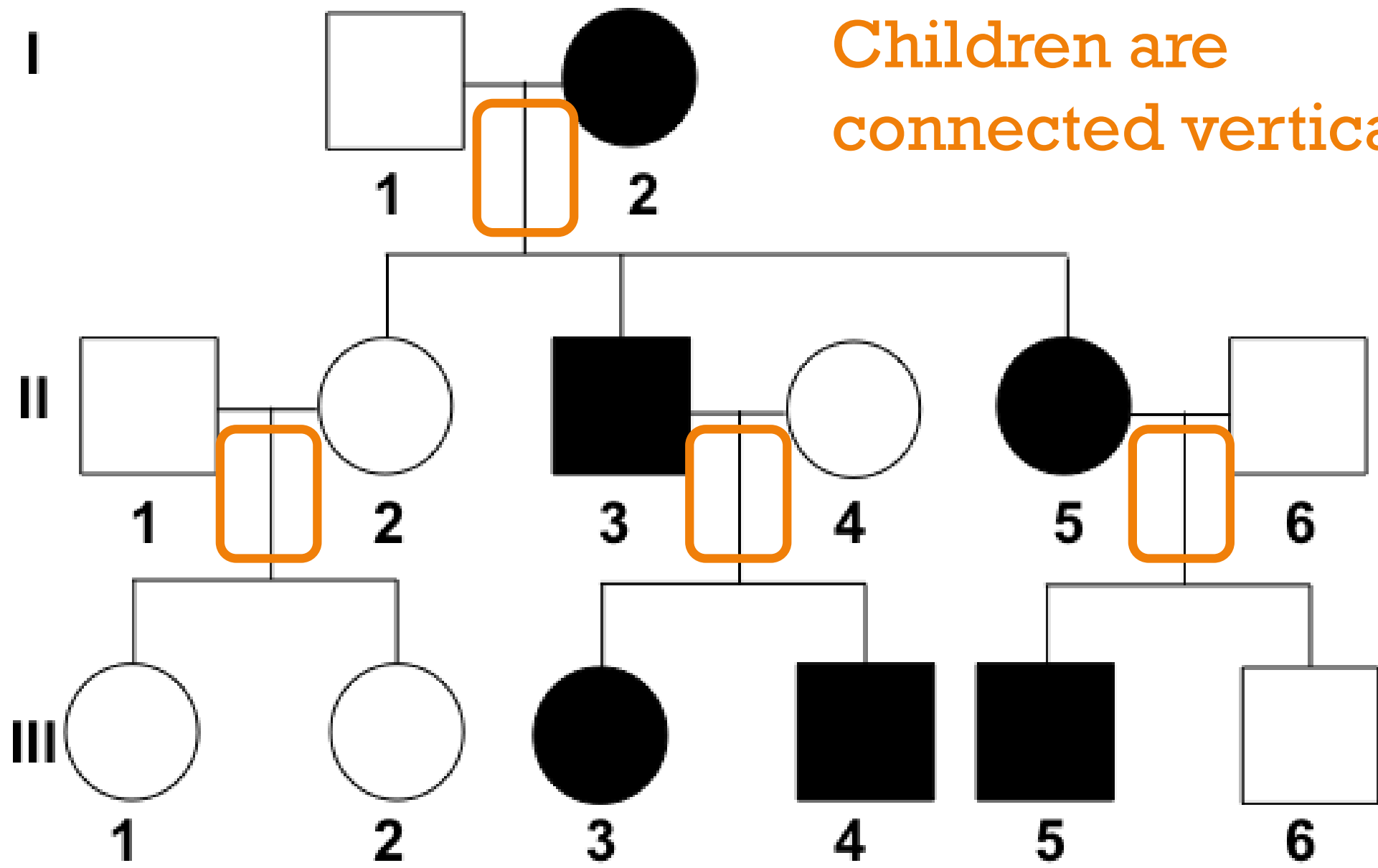
1 2 3 4 5 6

III



1 2 3 4 5 6

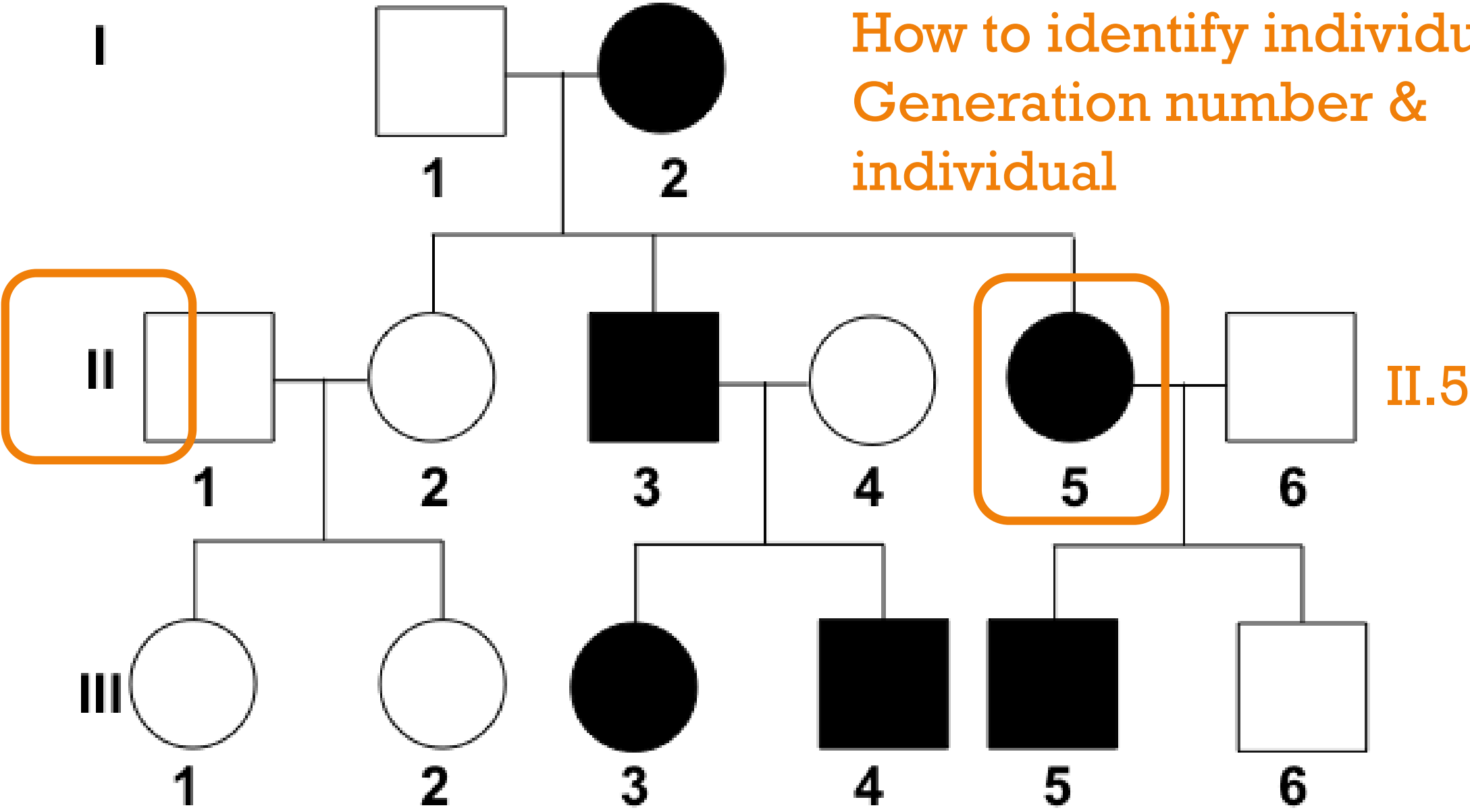




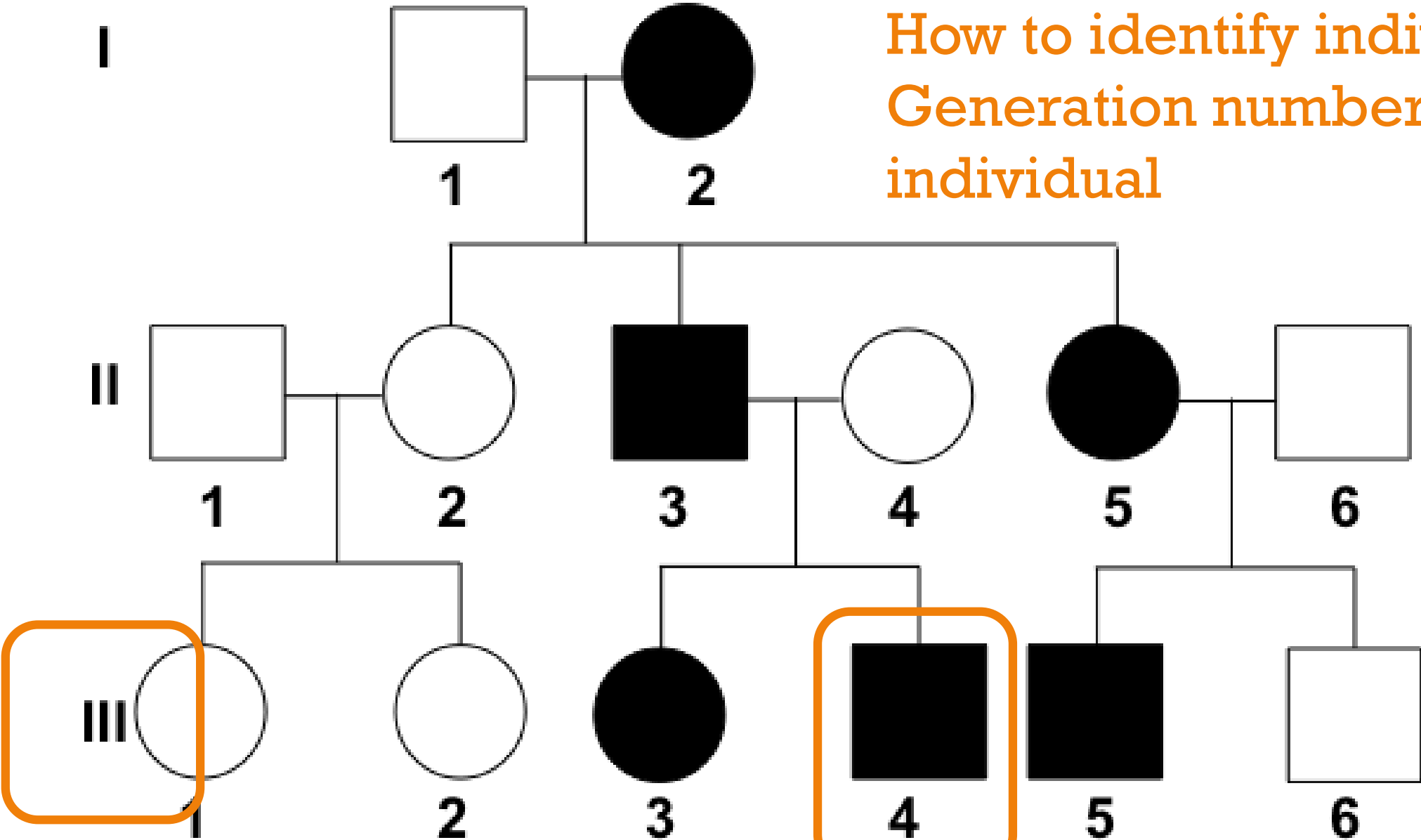
Children are connected vertically



How to identify individual:
Generation number &
individual

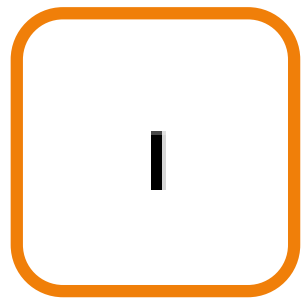


How to identify individual:
Generation number &
individual

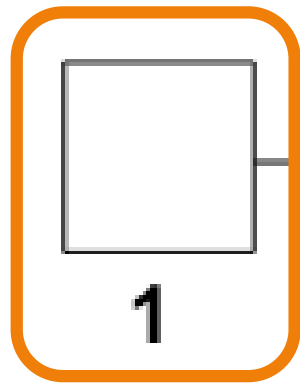


III.4

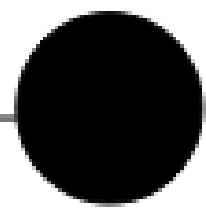




I.1



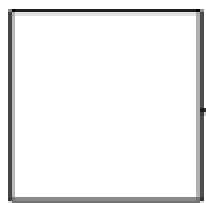
1



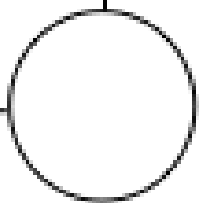
2

How to identify individual:
Generation number &
individual

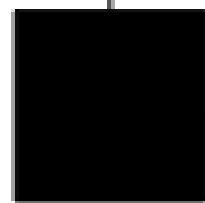
II



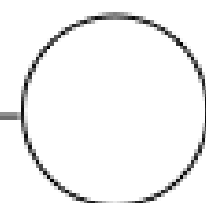
1



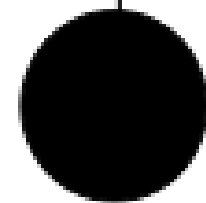
2



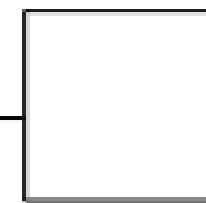
3



4

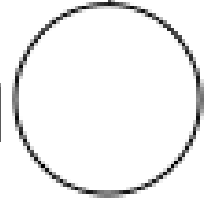


5

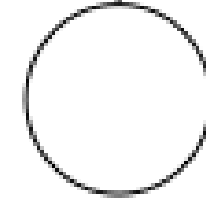


6

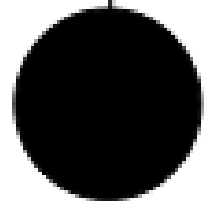
III



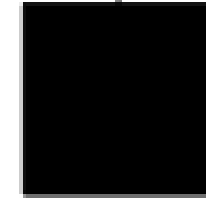
1



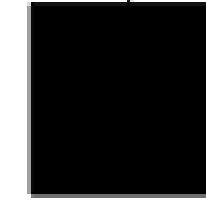
2



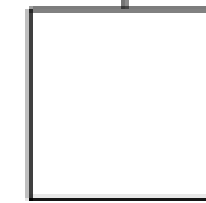
3



4

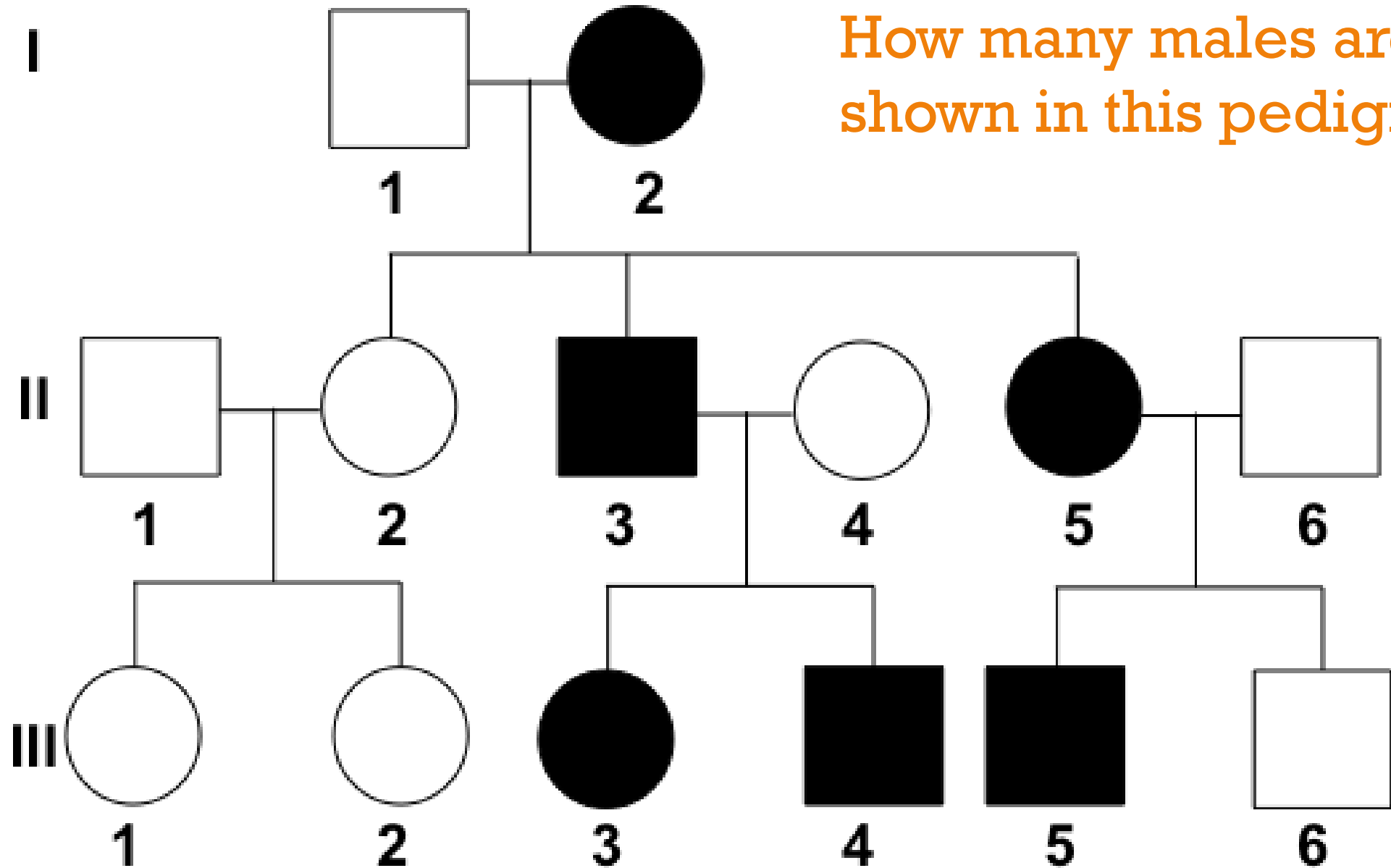


5



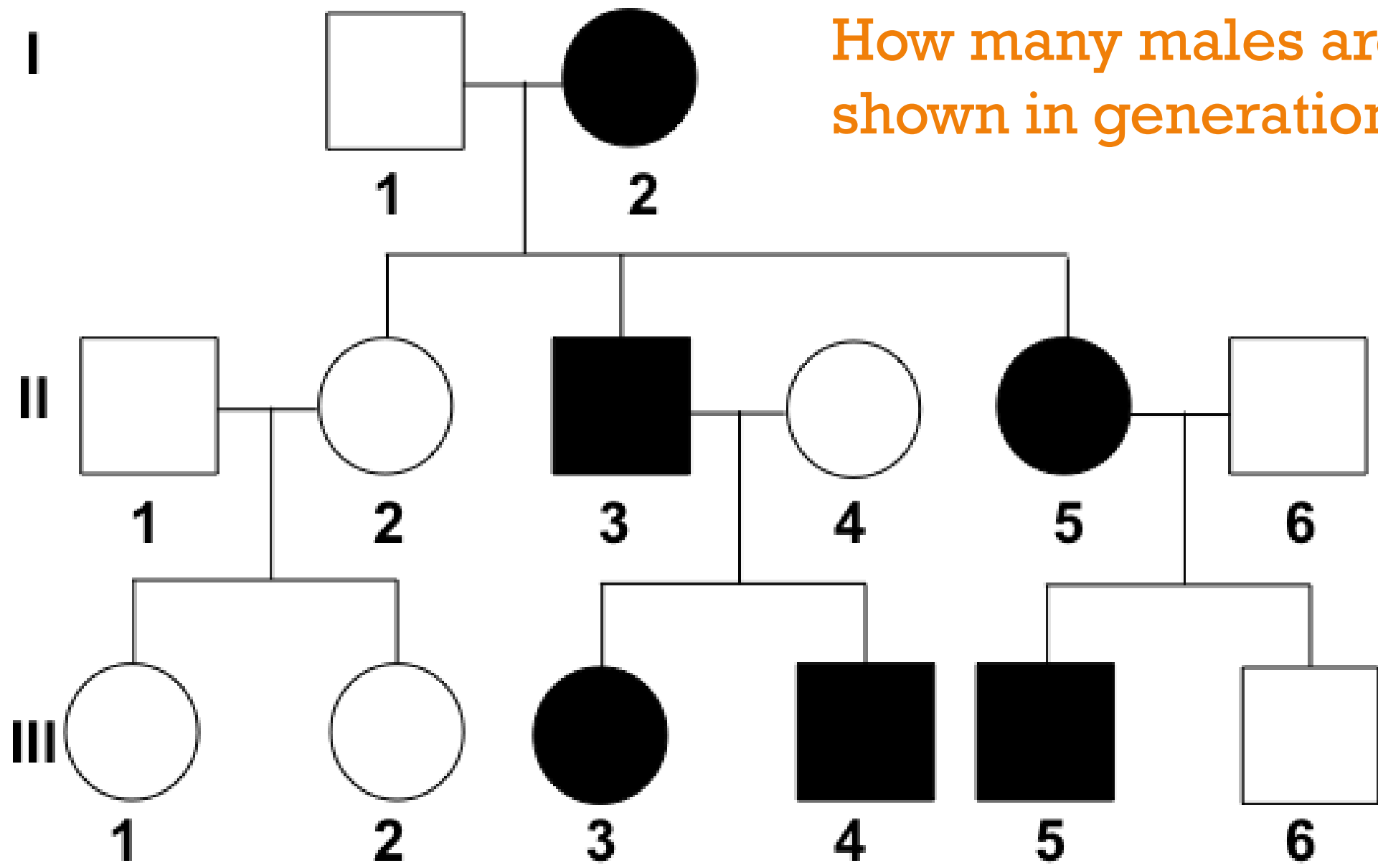
6





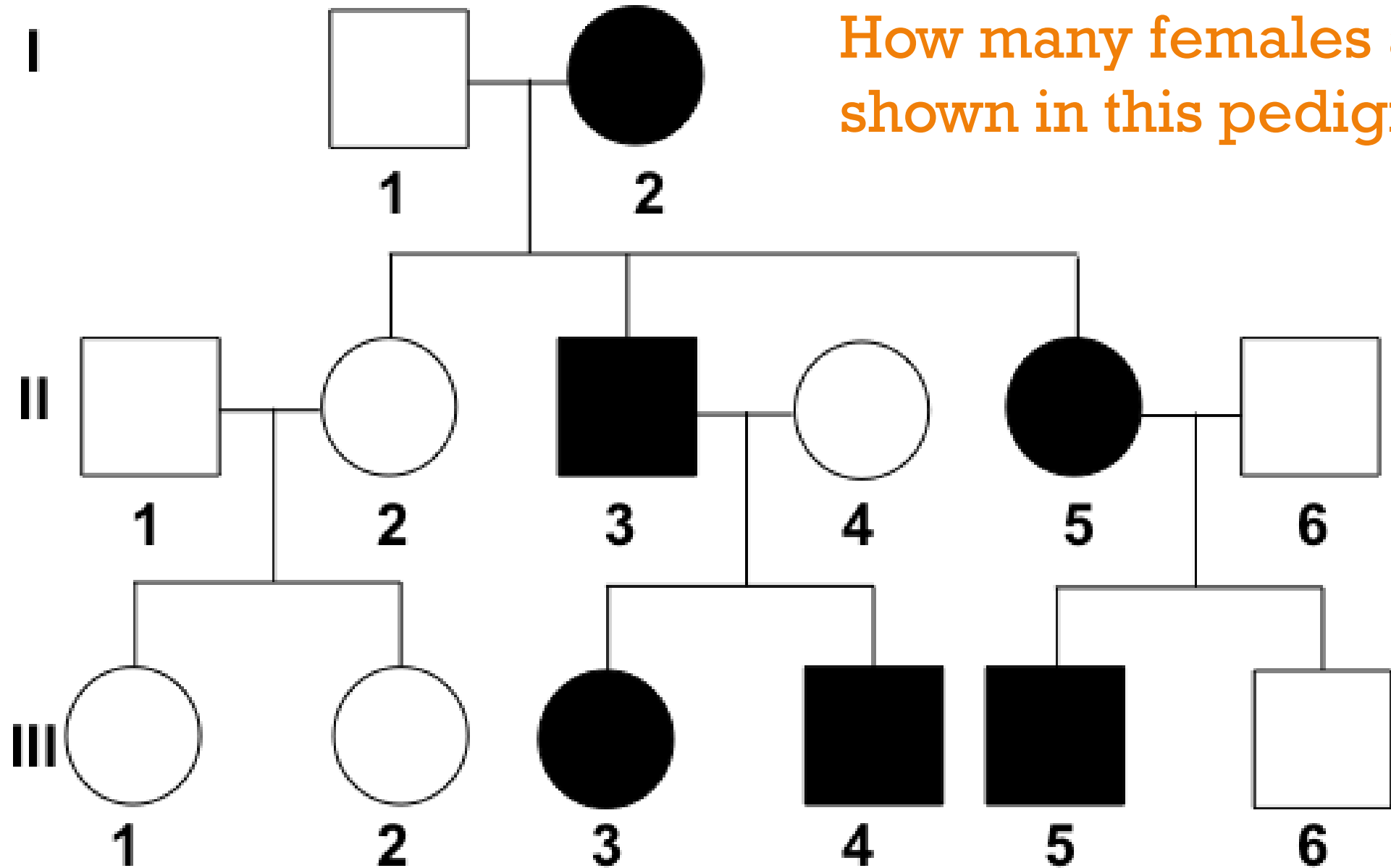
How many males are shown in this pedigree?





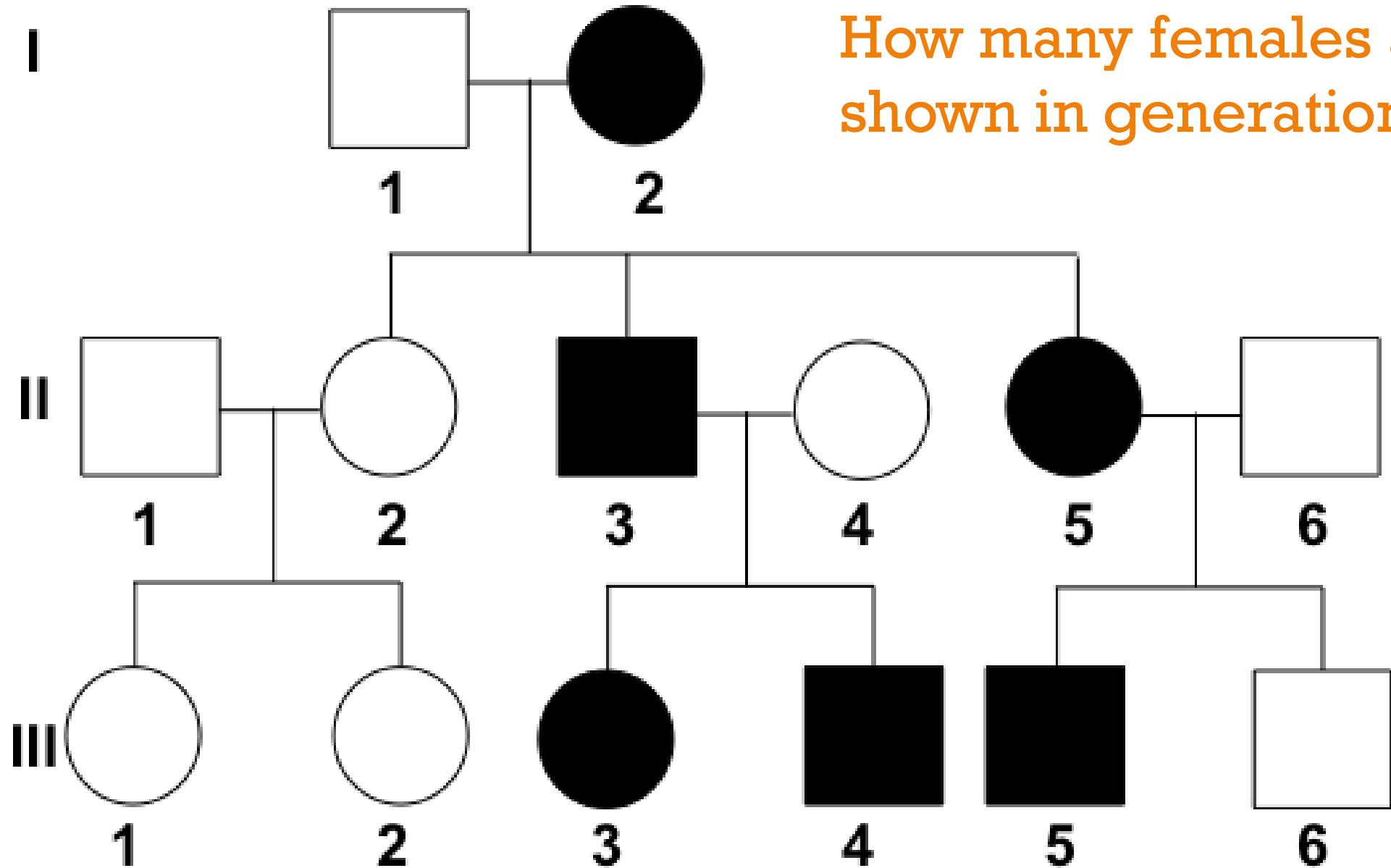
How many males are shown in generation II?





How many females are shown in this pedigree?

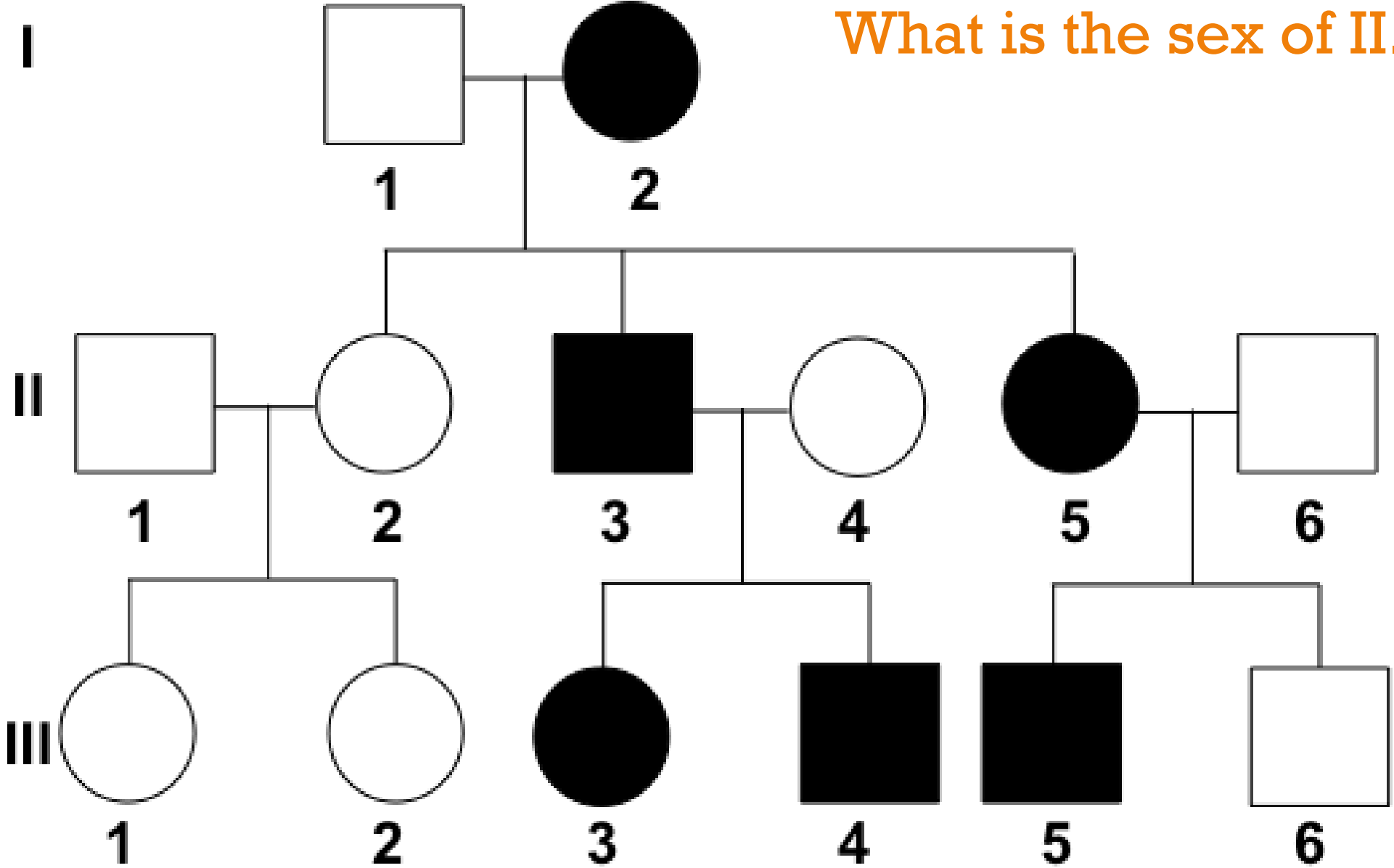




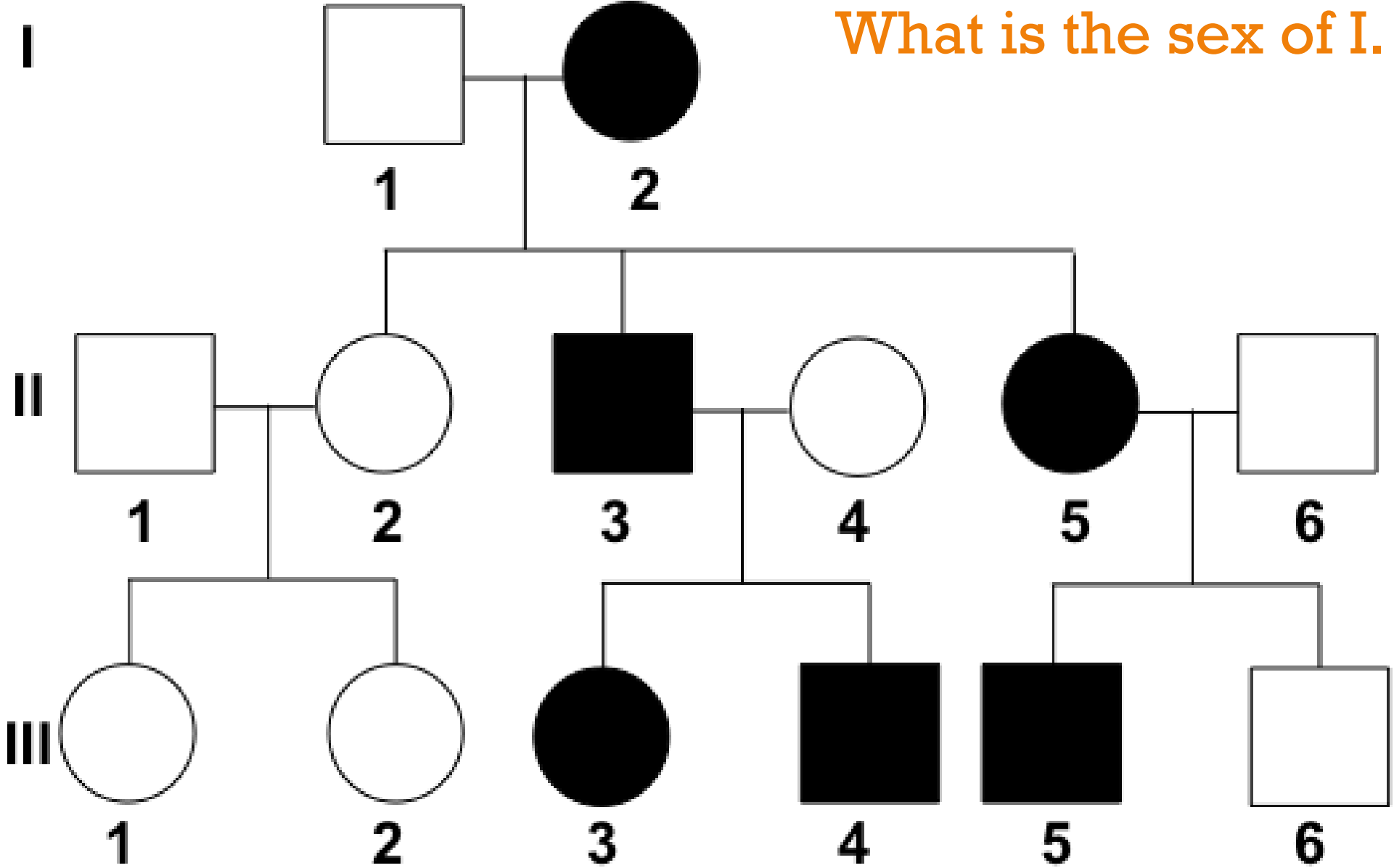
How many females are shown in generation III?

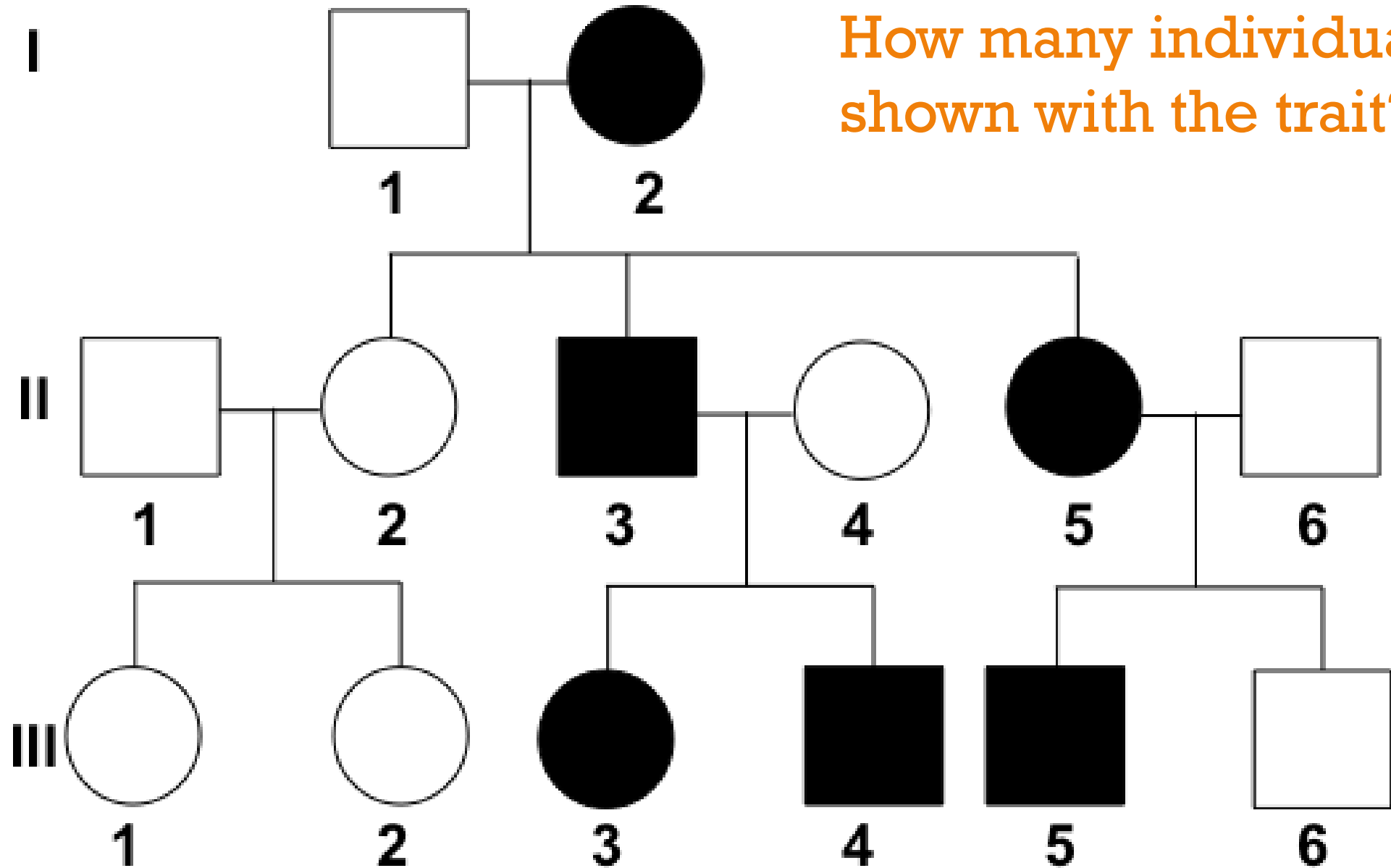


What is the sex of II.5?



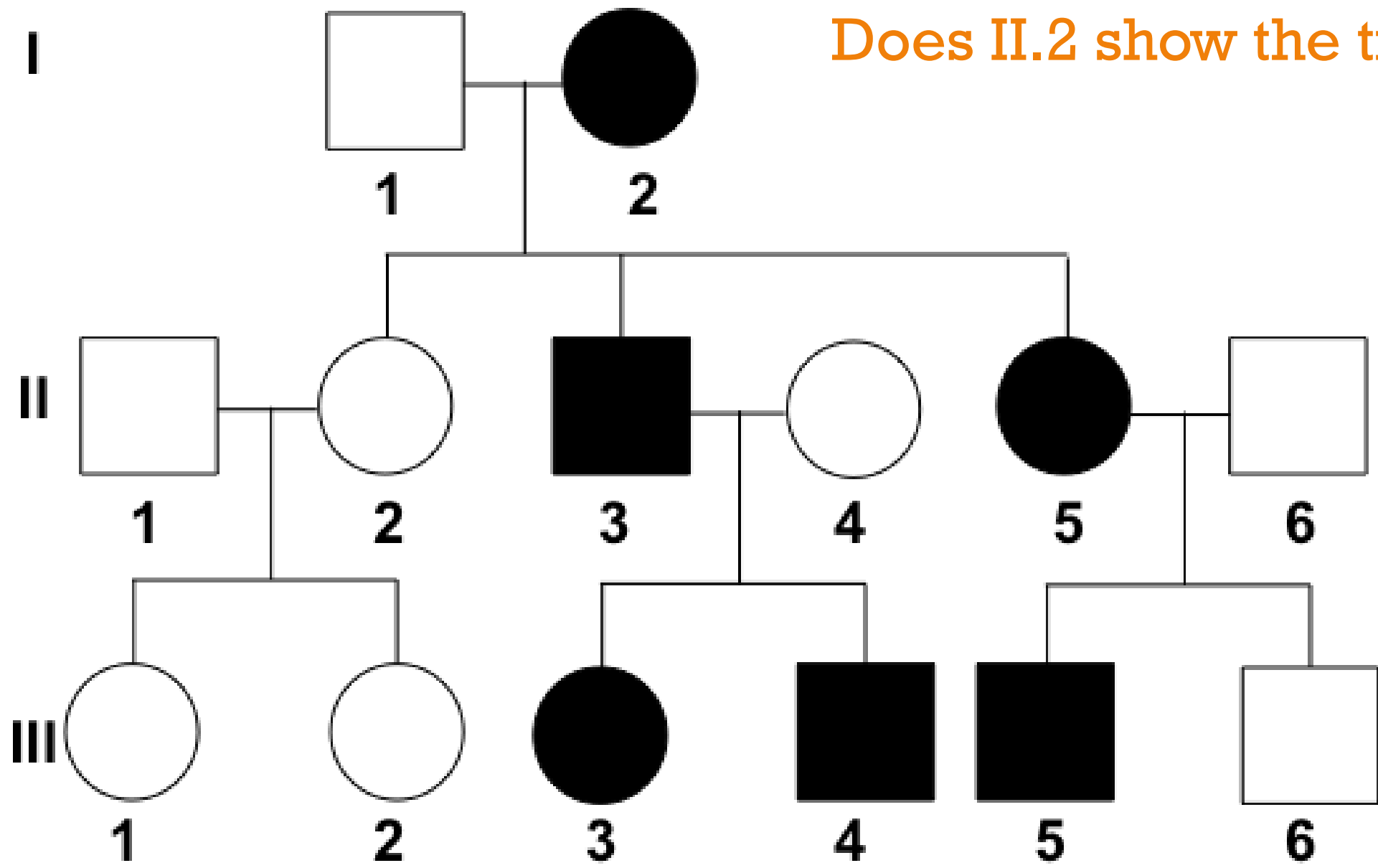
What is the sex of I.1?





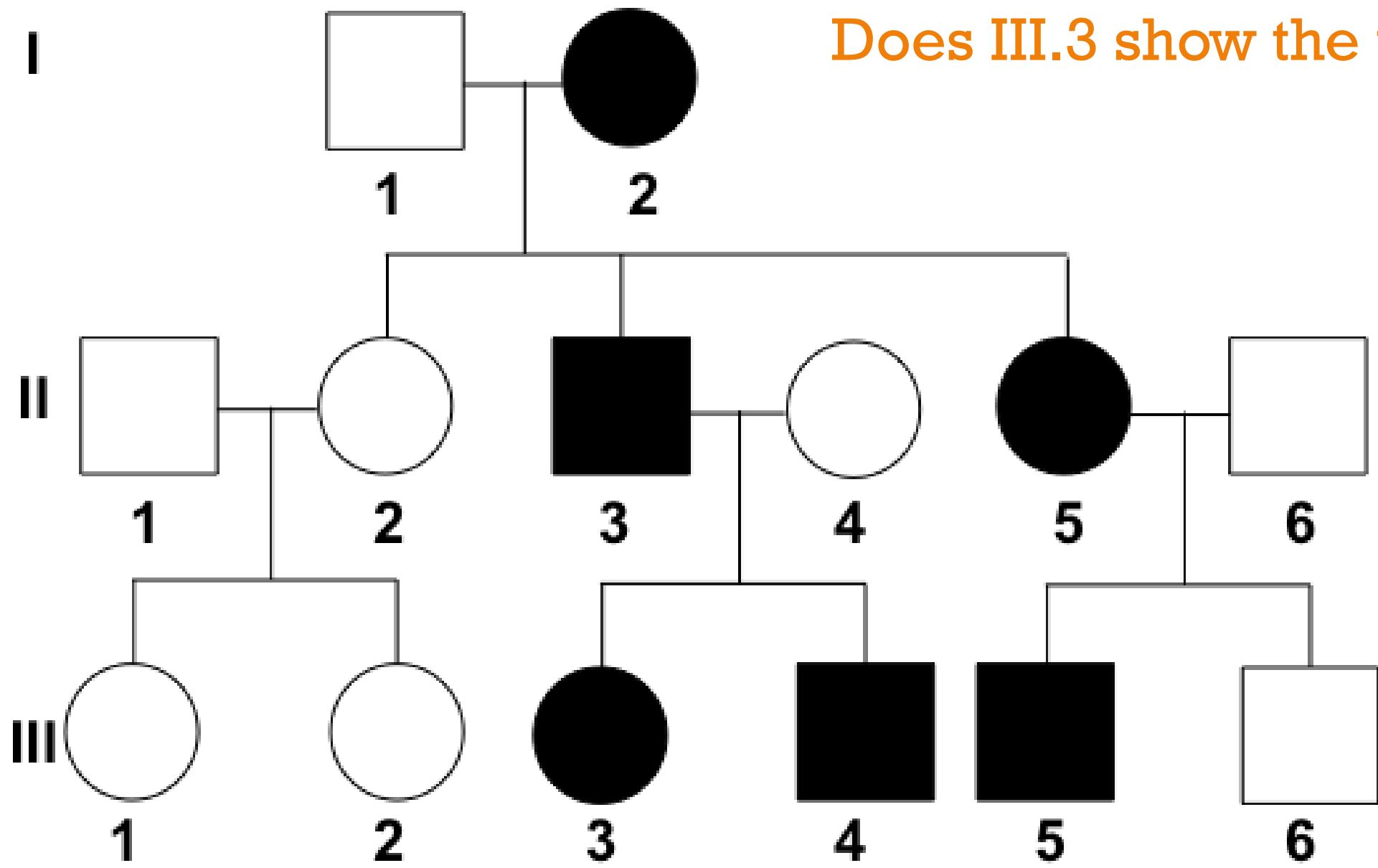
How many individuals are shown with the trait?





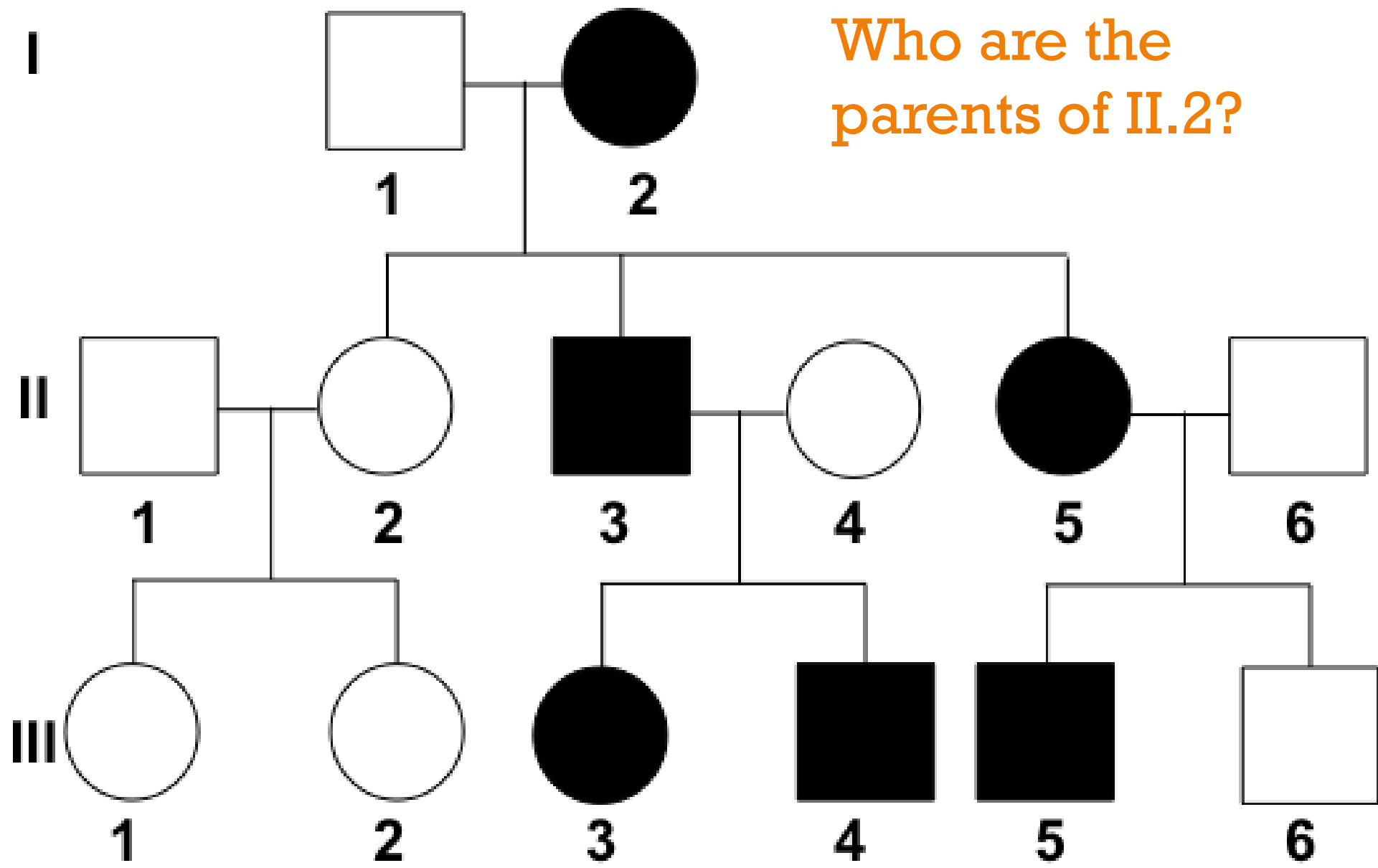
Does II.2 show the trait?





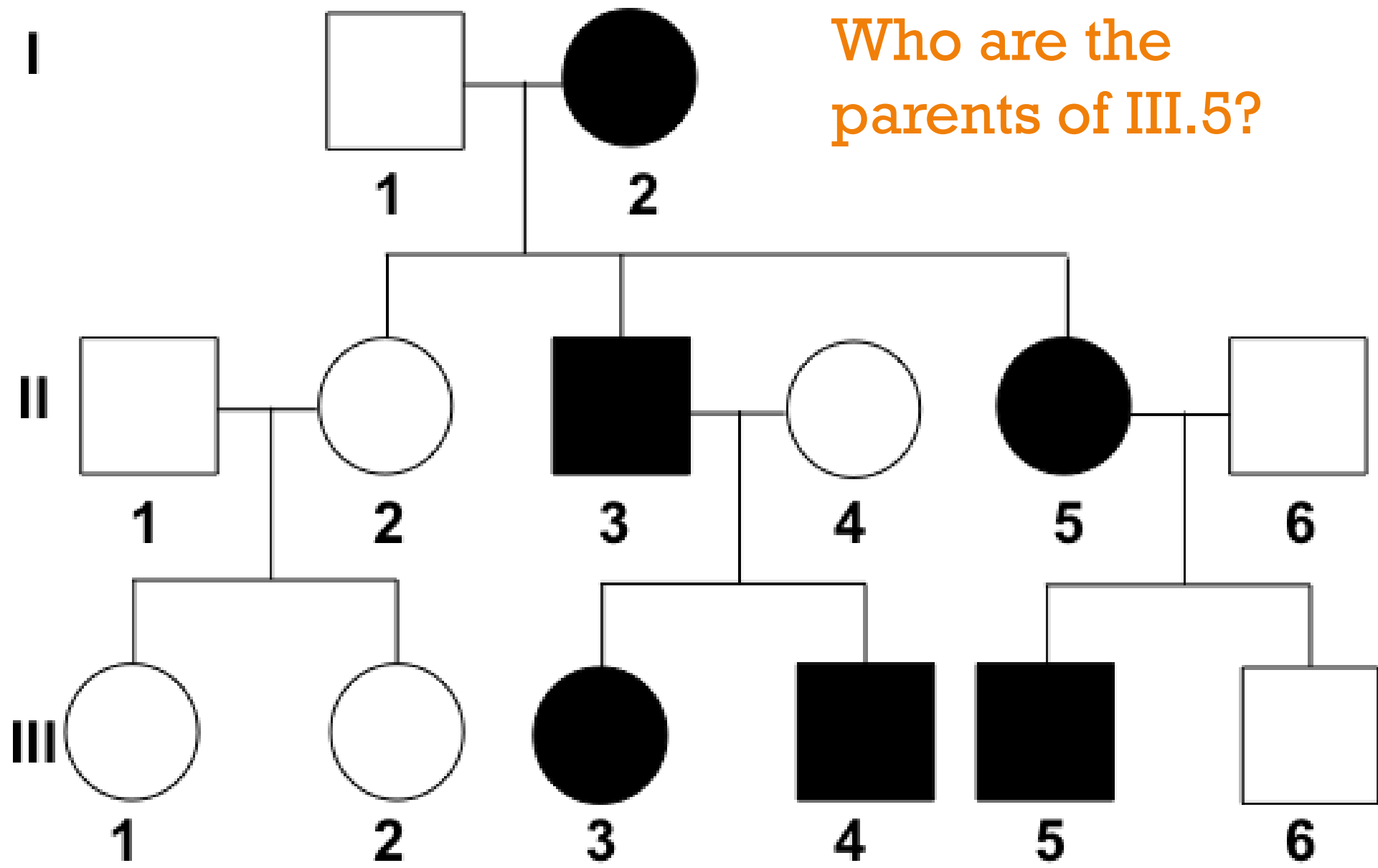
Does III.3 show the trait?





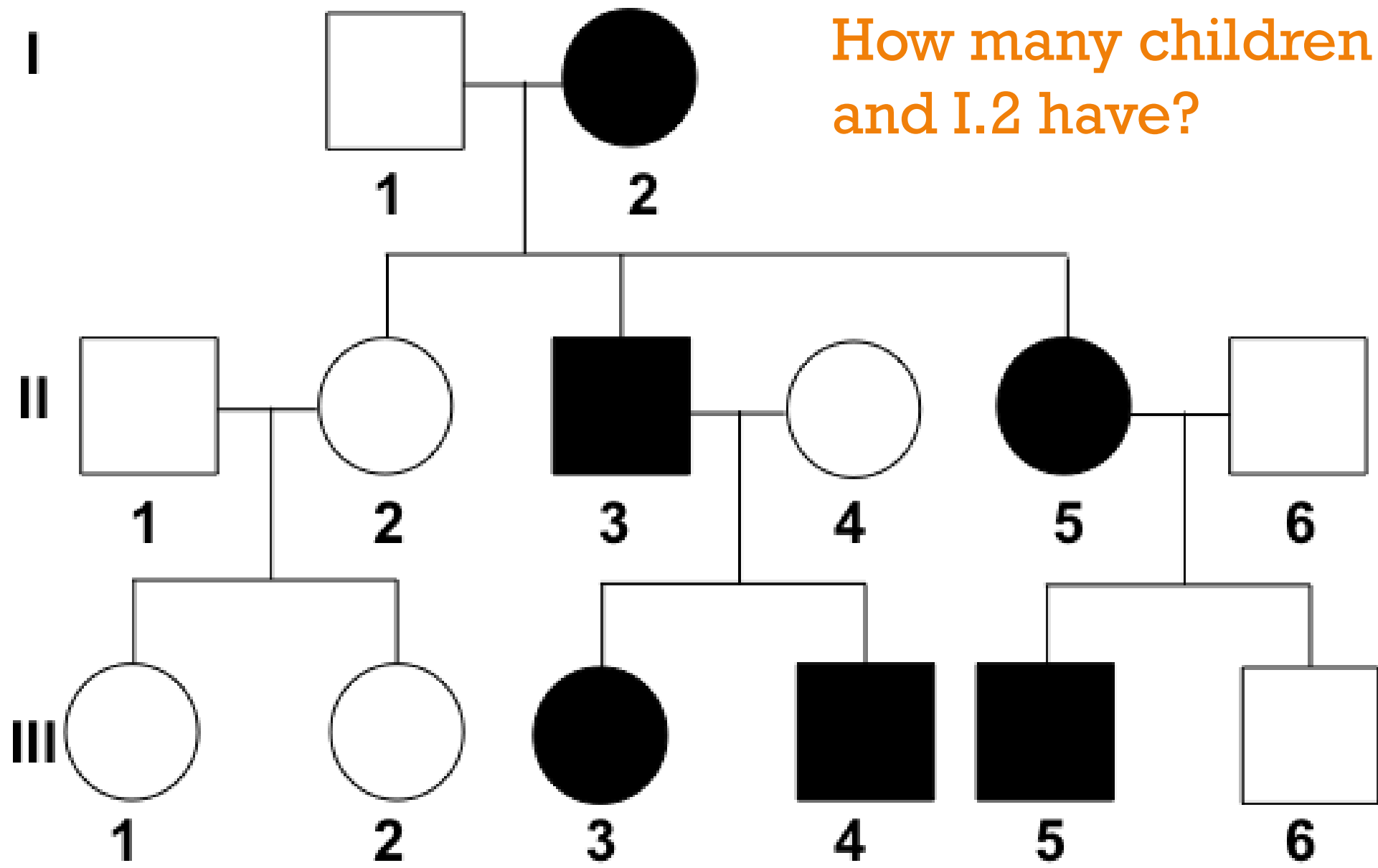
Who are the
parents of II.2?





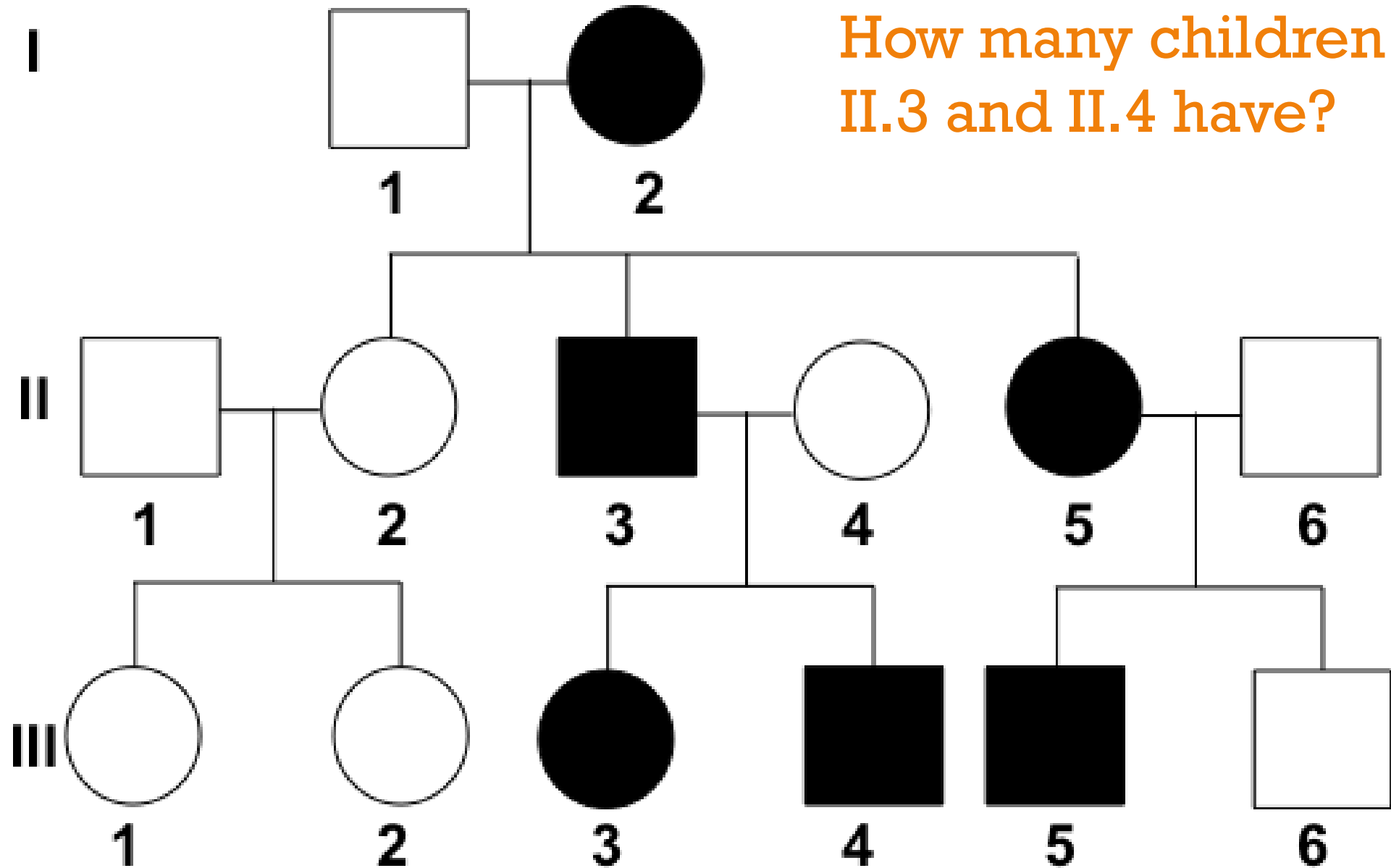
Who are the
parents of III.5?





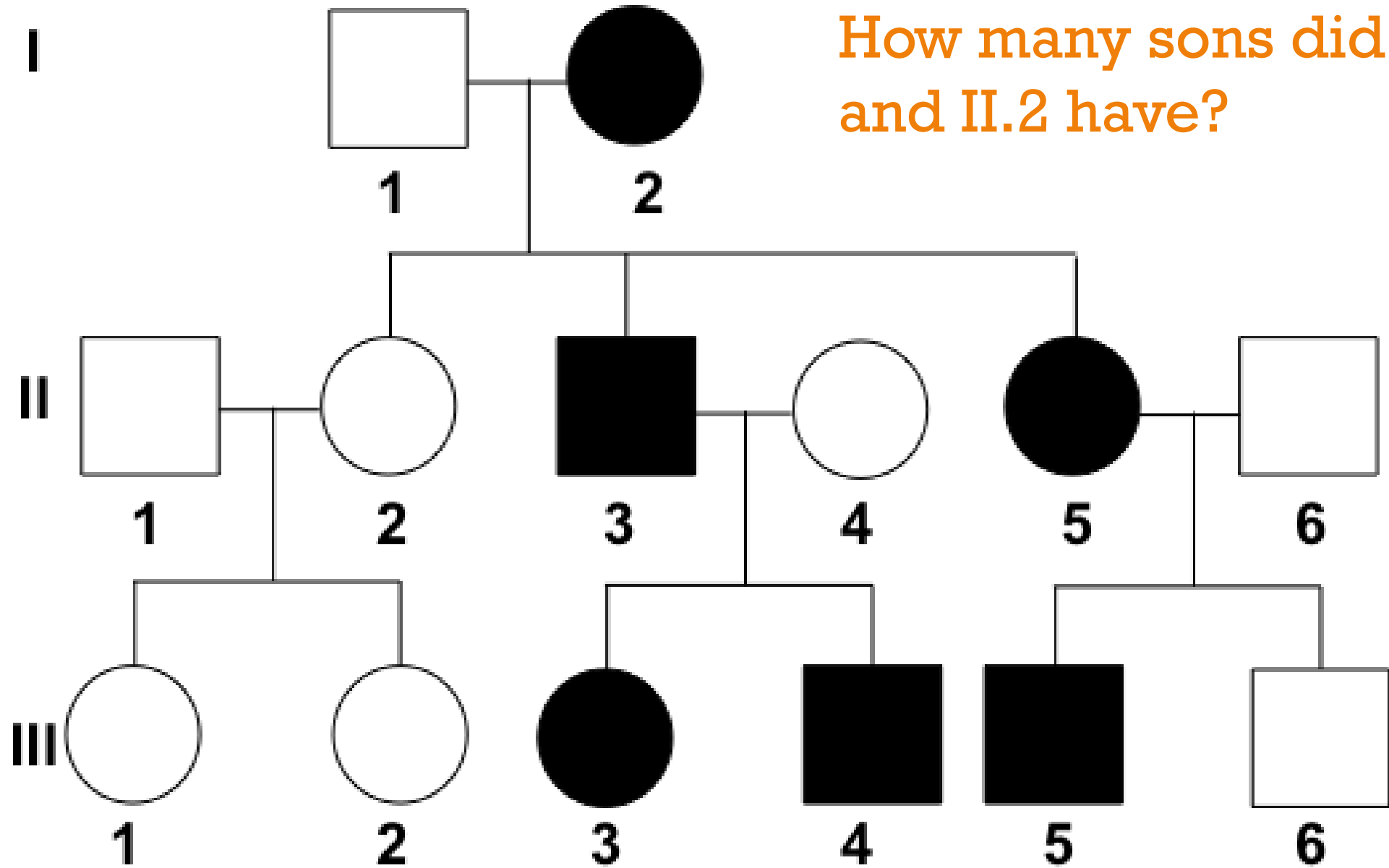
How many children did I.1 and I.2 have?





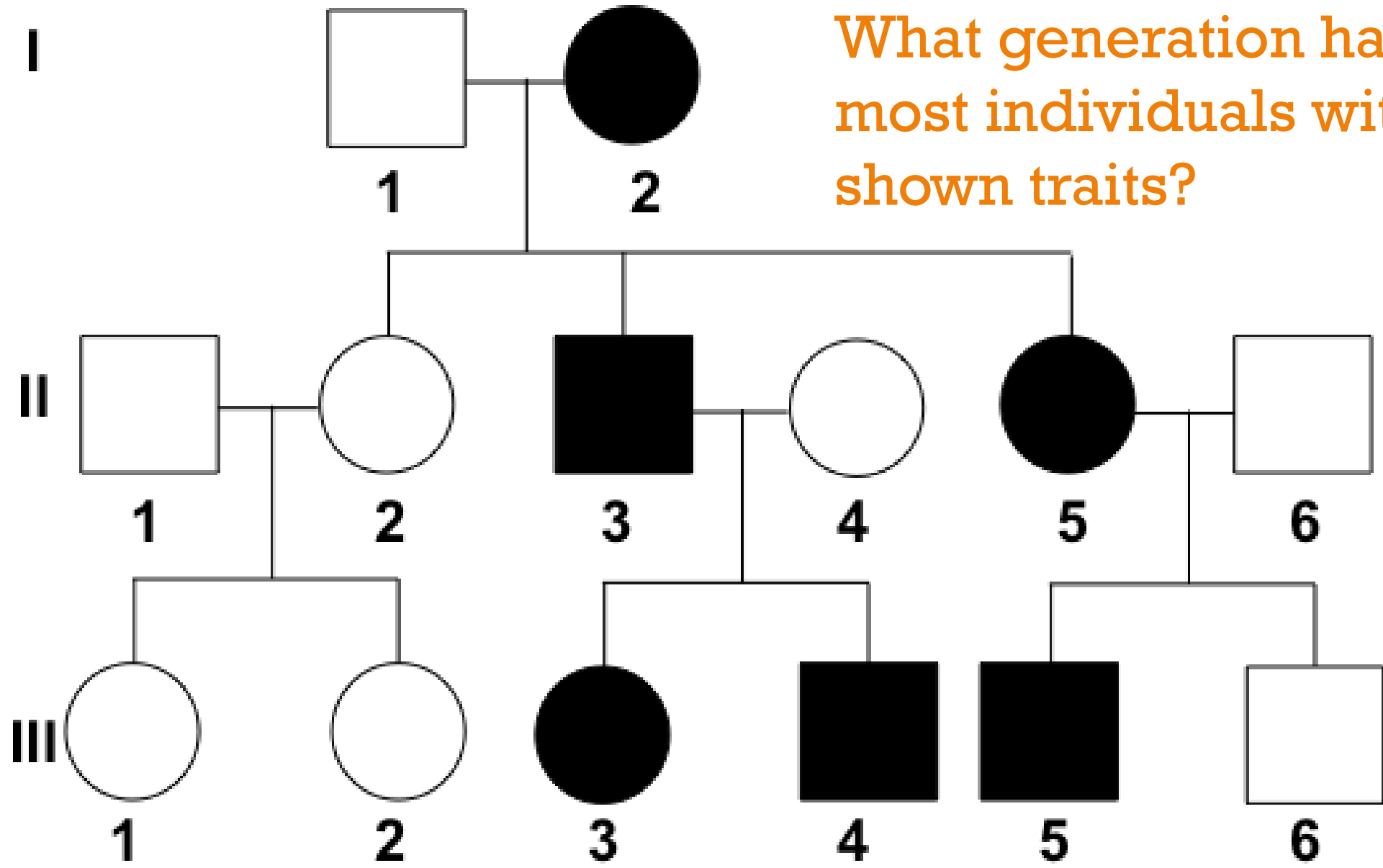
How many children did II.3 and II.4 have?





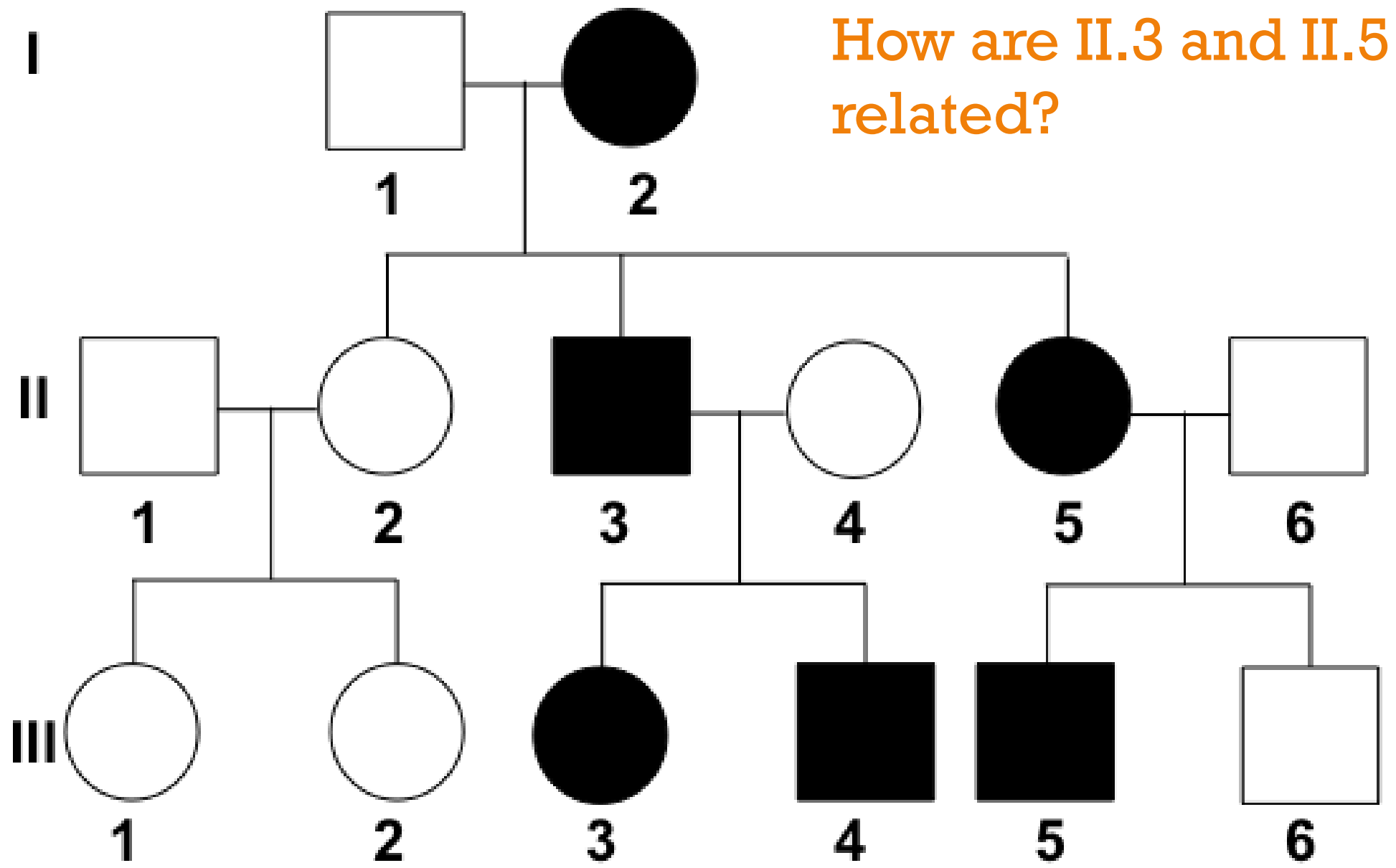
How many sons did II.1 and II.2 have?

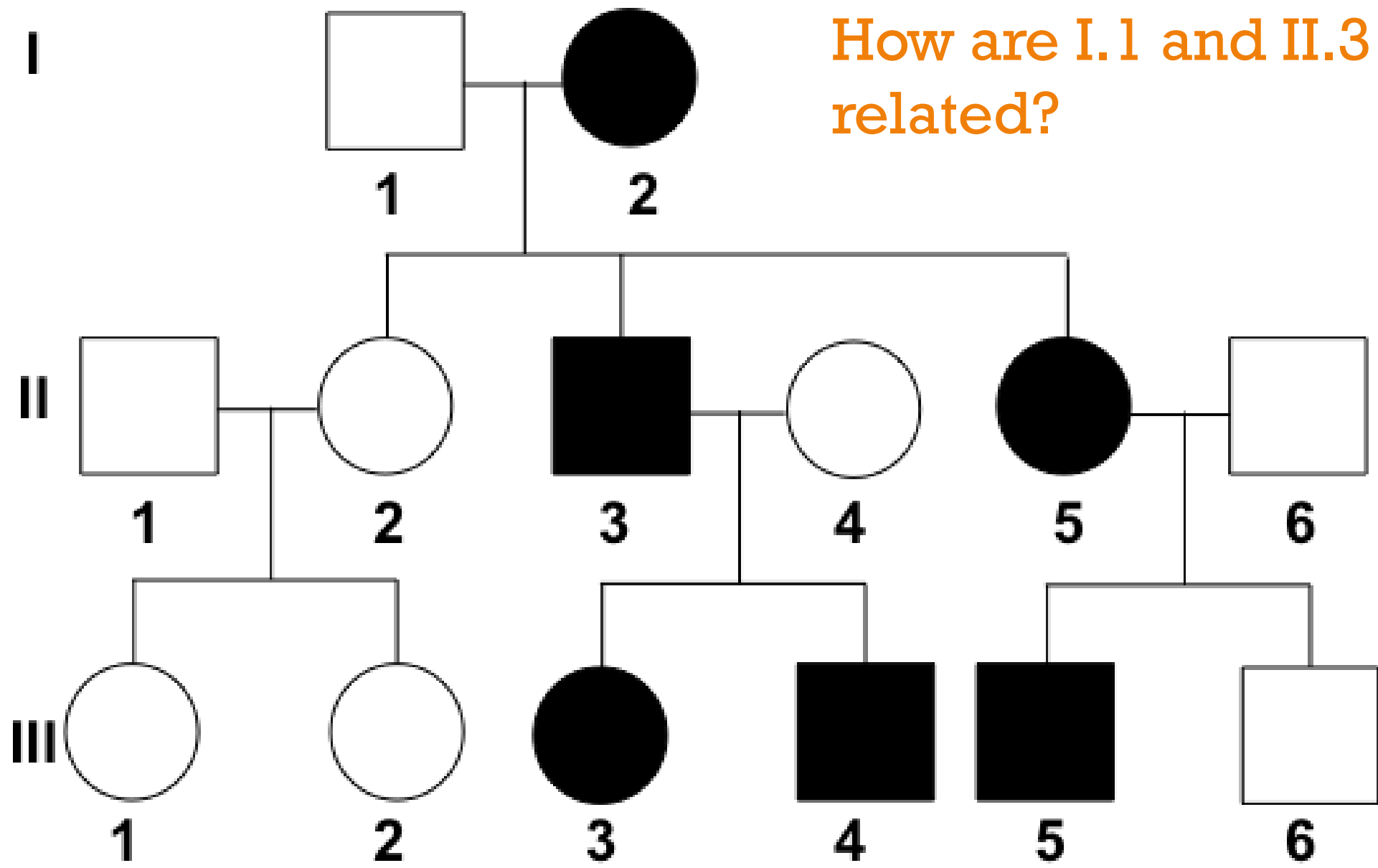




What generation has the most individuals with shown traits?

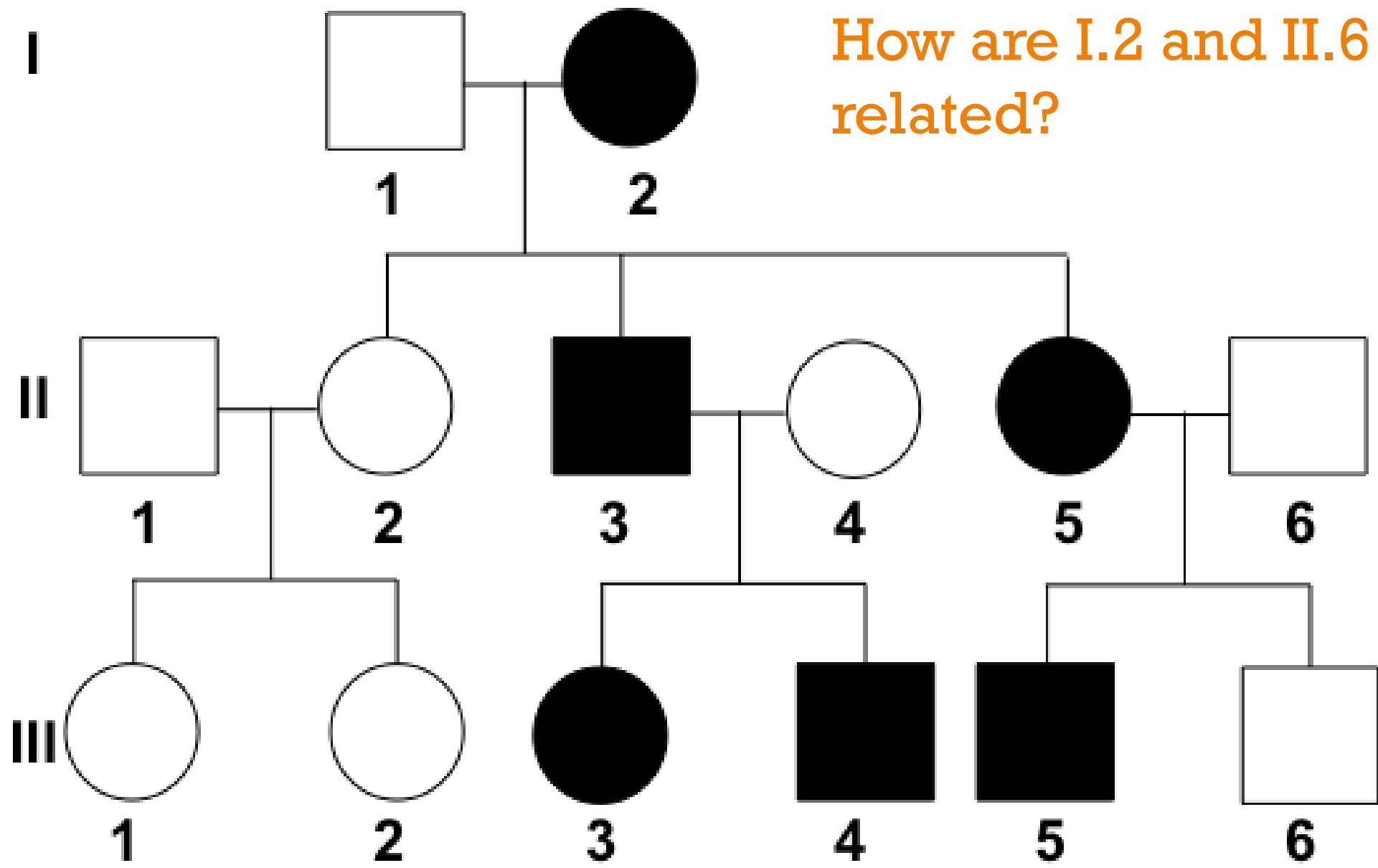






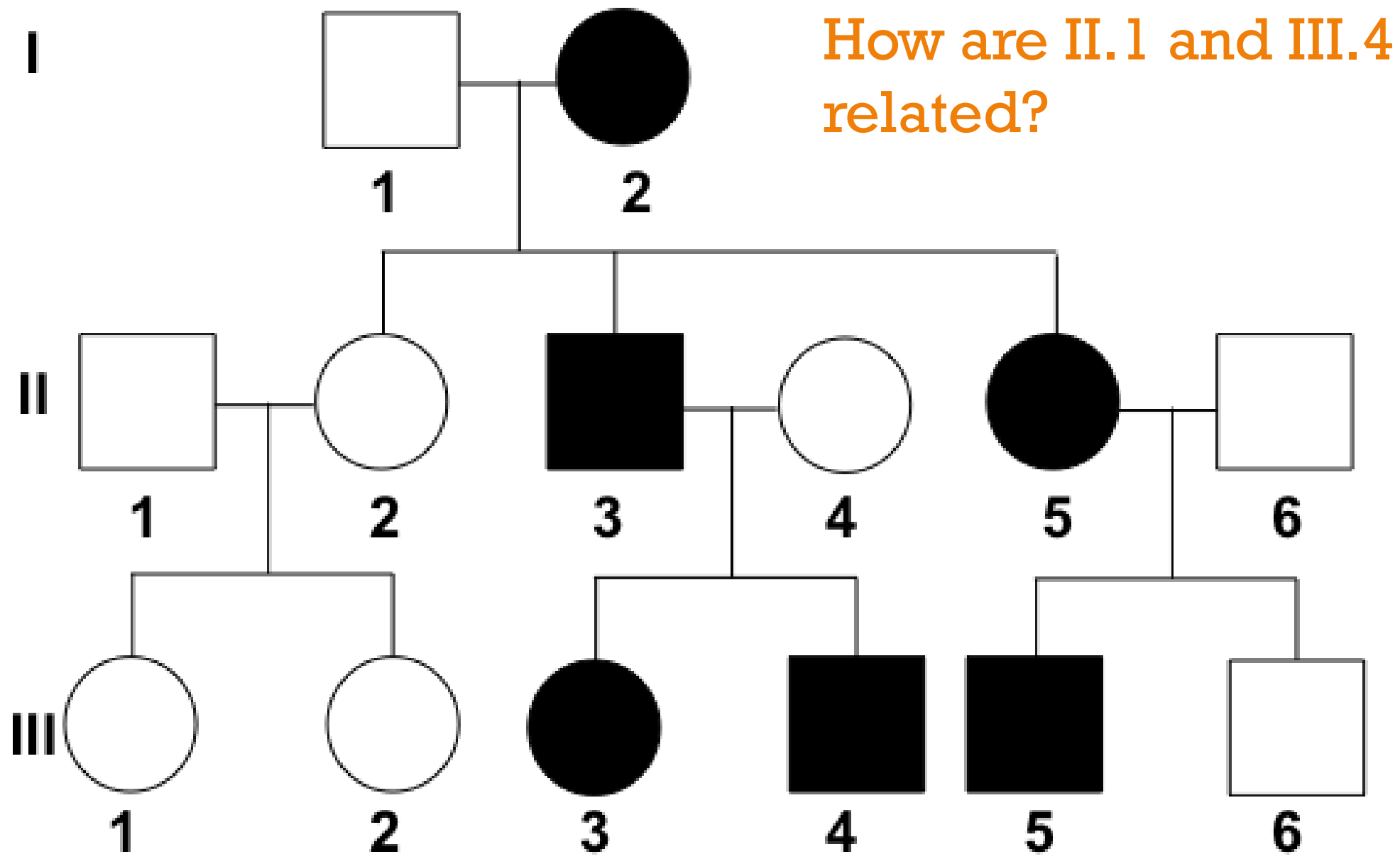
How are I.1 and II.3 related?

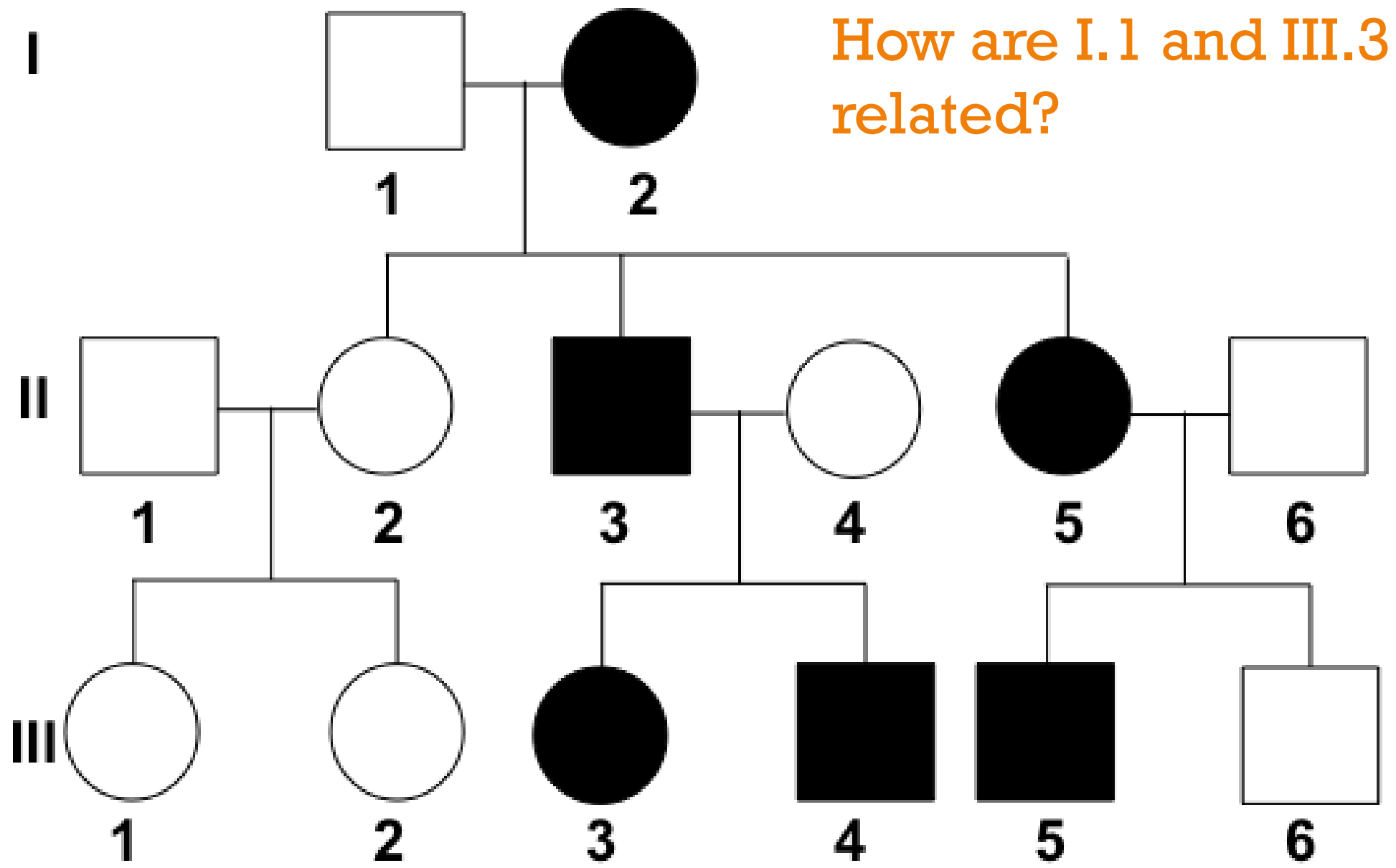




How are I.2 and II.6 related?

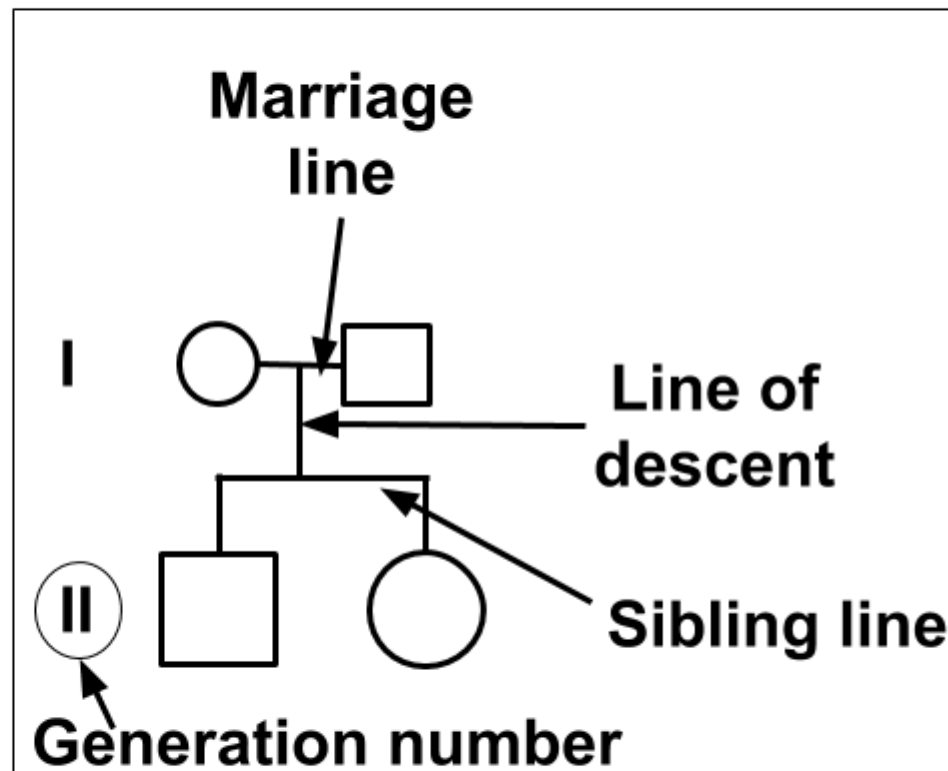
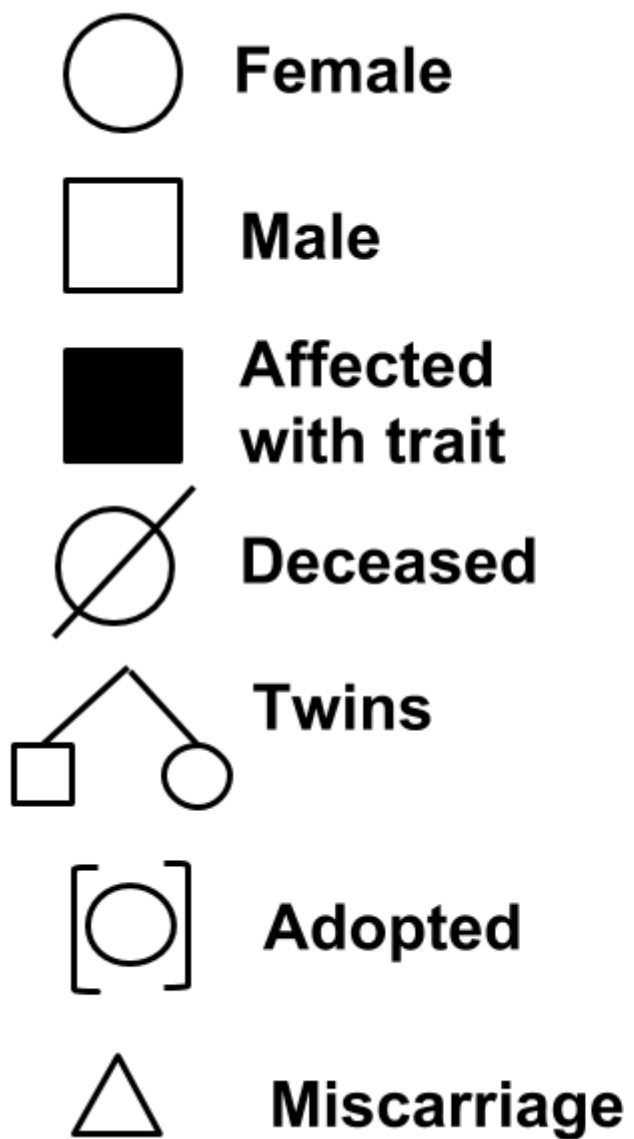






How are I.1 and III.3 related?



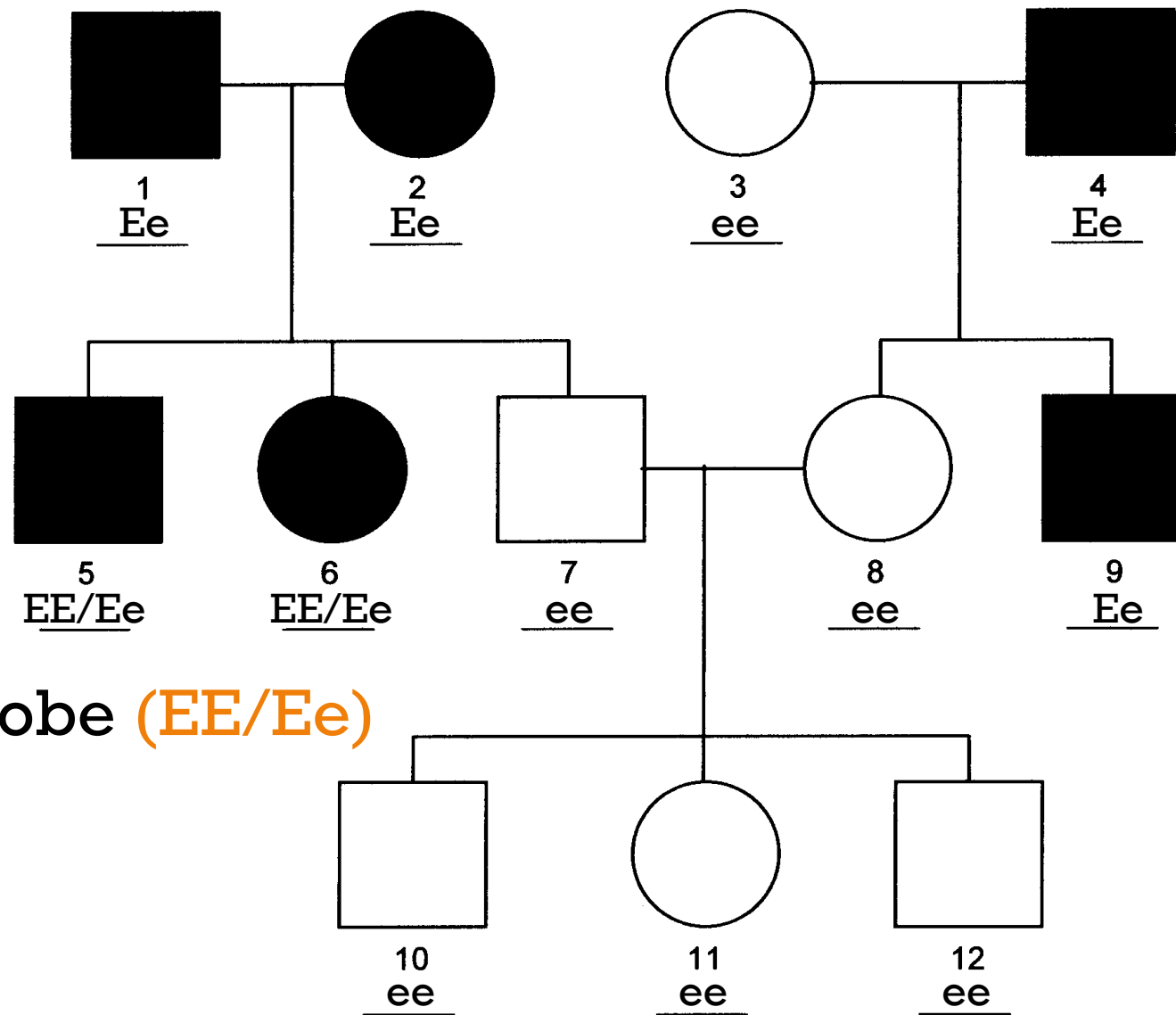


WHAT IS AN AUTOSOMAL TRAIT?

- A trait on a non-sex chromosome
- Two types
 - **Autosomal dominant:** Huntington's disease, attached (ee) vs. unattached earlobes (EE/Ee)
 - **Autosomal recessive:** Albinism, cystic fibrosis



Autosomal Dominant



Unattached earlobe (EE/Ee)

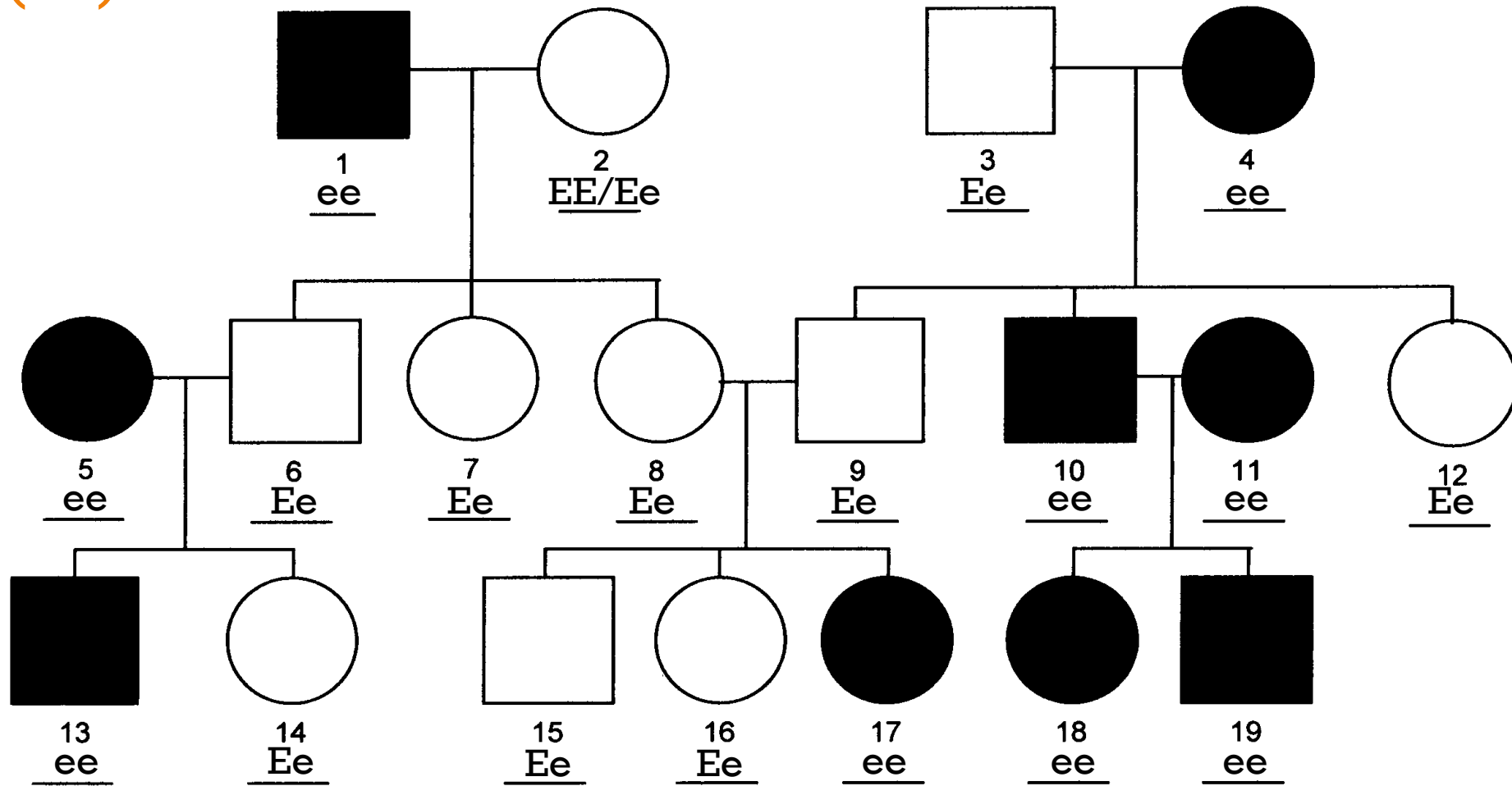
Attached (ee)



AUTOSOMAL RECESSIVE

Melanism (**EE/Ee**)

Albinism (**ee**)

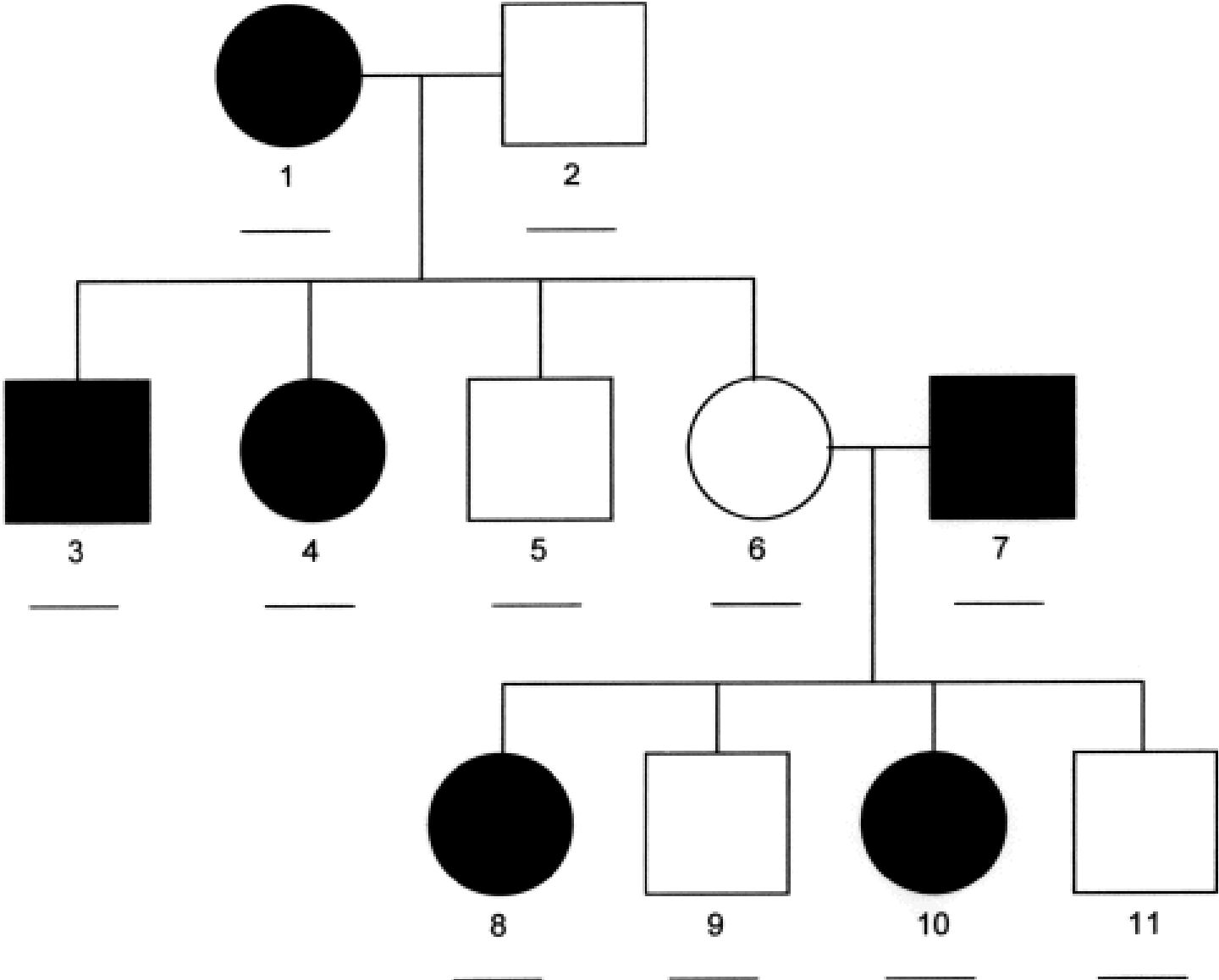


WHAT IS A SEX-LINKED TRAIT?

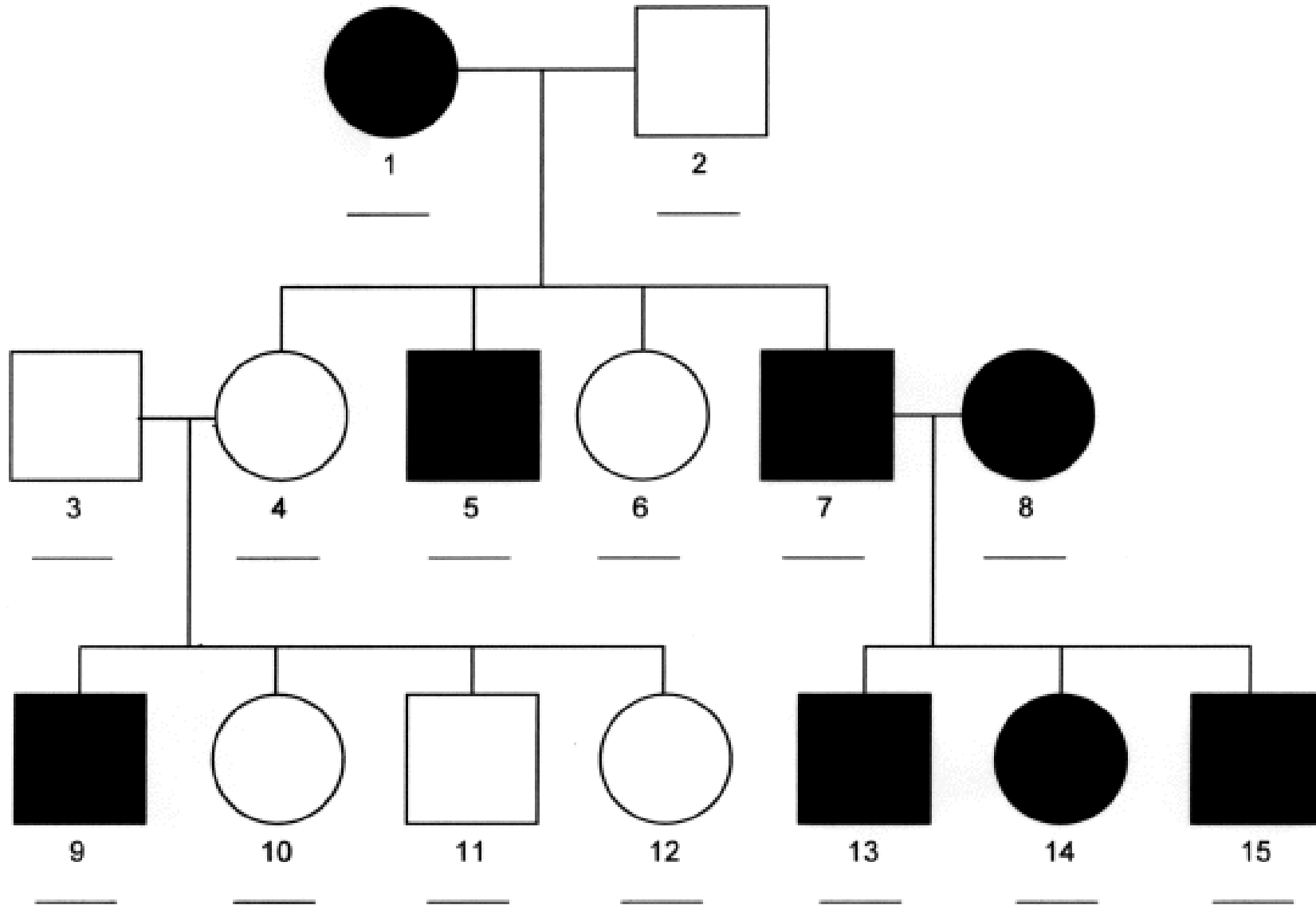
- A trait on a sex chromosome
- Three types
 - X-linked dominant: Hypophosphatemic rickets
Rickets (X^G) soft or weak bones in children)
 - X-linked recessive: Hemophilia (X^b)
 - Y-linked recessive: Auricular hypertrichosis (Y^e)



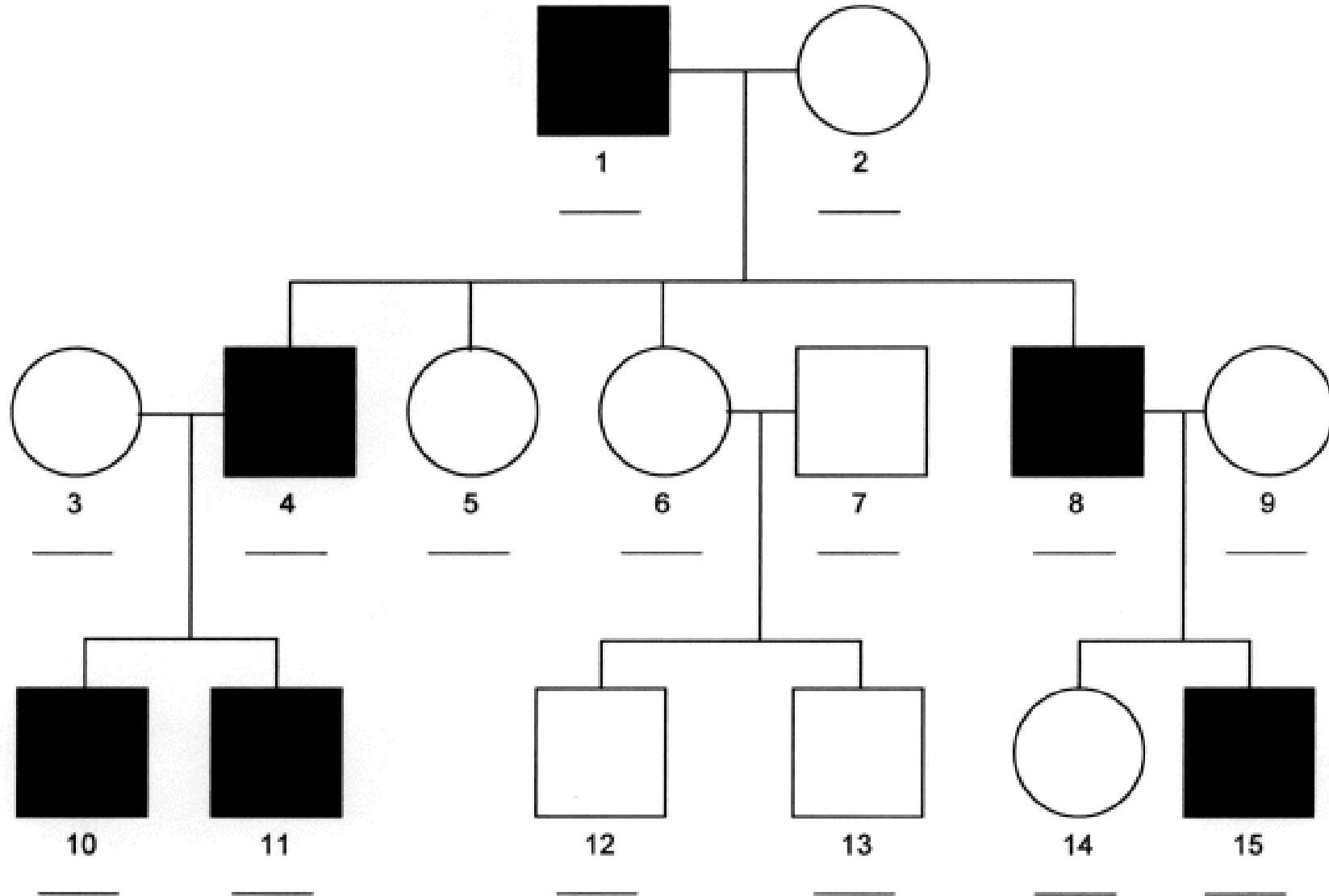
X-linked Dominant



X-linked Recessive



Y-linked Inheritance



WHAT DOES CARRIER MEAN?

- A person or other organism that has **inherited a recessive allele** for a genetic trait or mutation
- Previous Examples
 - Attached earlobe carrier: **Ee** or **ee**
 - Albinism carrier: **Ee** or **ee**



Parents:

Color vision gene

• Normal allele

• Defective allele



X X



Normal vision
(Colorblindness carrier)

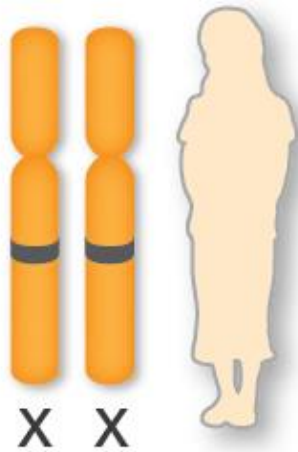


X Y



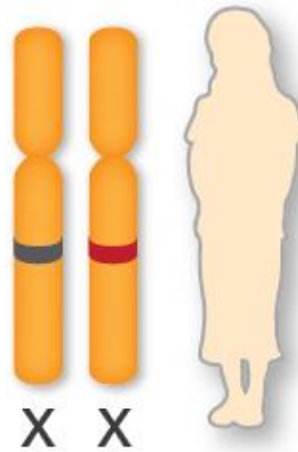
Normal vision

Possible offspring:



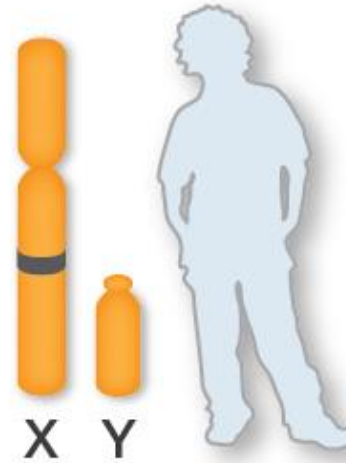
X X

Normal vision



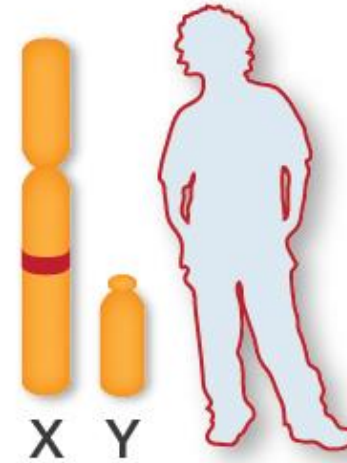
X X

Normal vision
(Colorblindness carrier)



X Y

Normal vision



X Y

Colorblind



COLORBLINDNESS PEDIGREE

