Heredity

Mendelian ways of inheritance

Véronique Nas

4 October 2013

Heredity

three ways of inheritance

1 autosomal **dominant**
2 autosomal **recessive**
3 x-linked

autosomal =
not on the sex chromosomes

x-linked =
on the female sex chromosome

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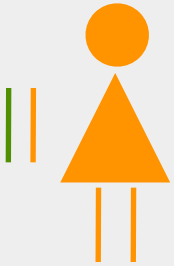

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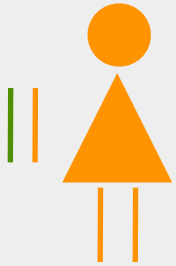

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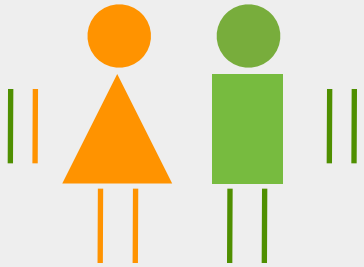

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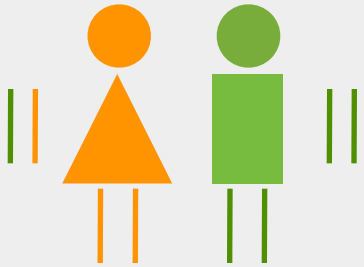

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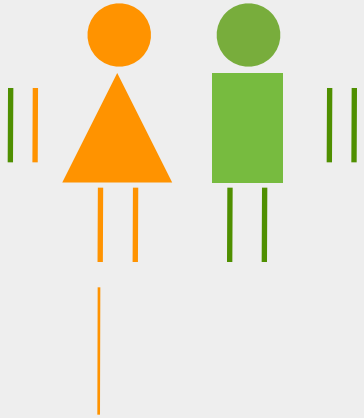

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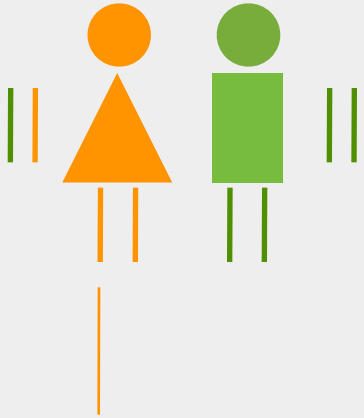

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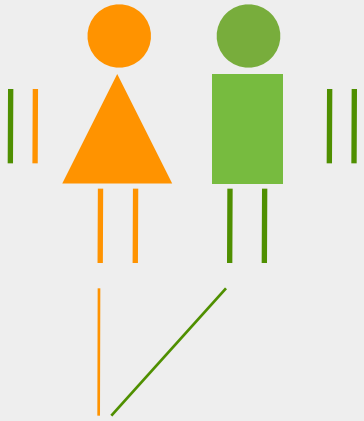

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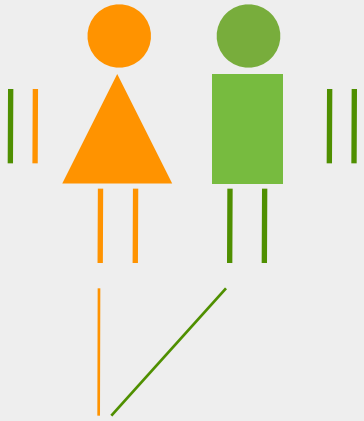

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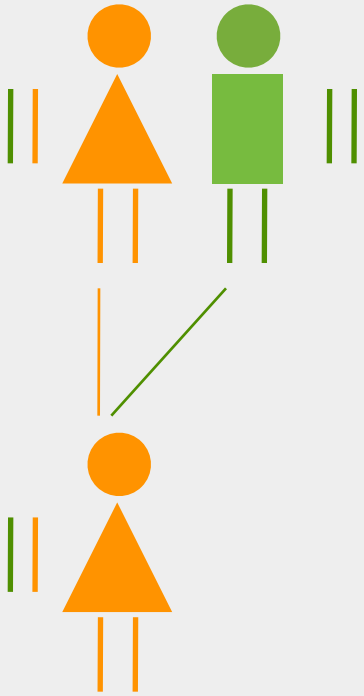

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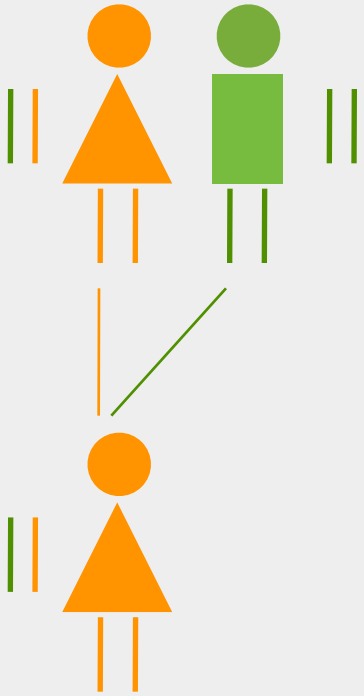

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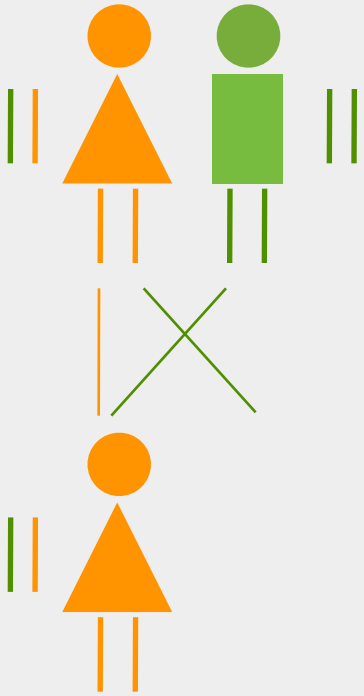

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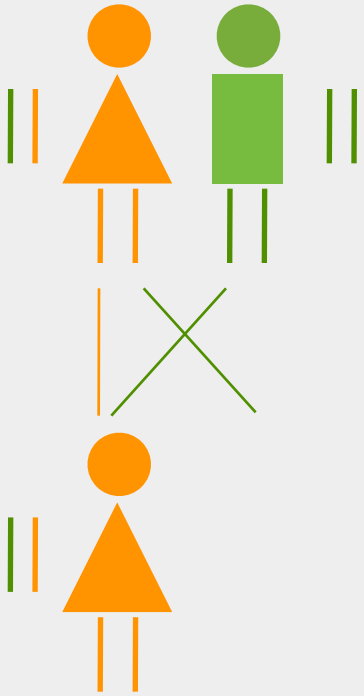

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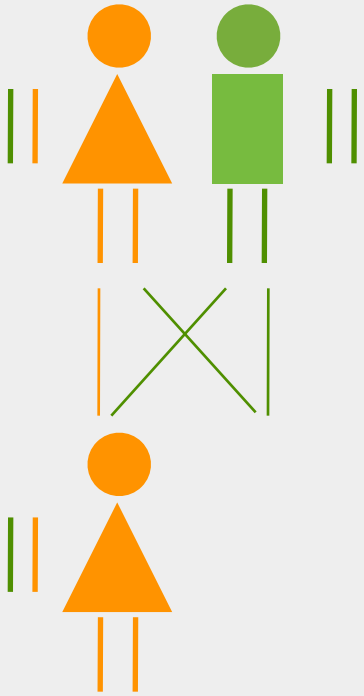

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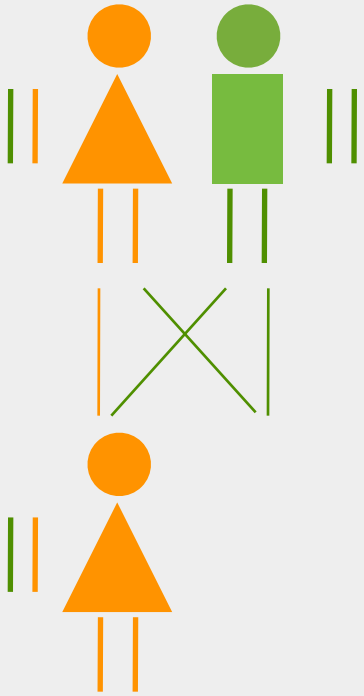

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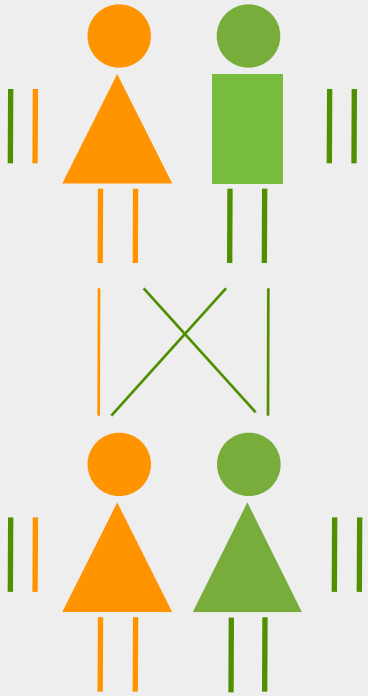

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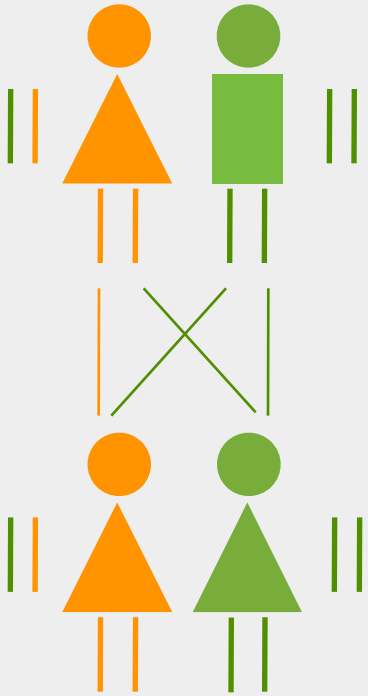

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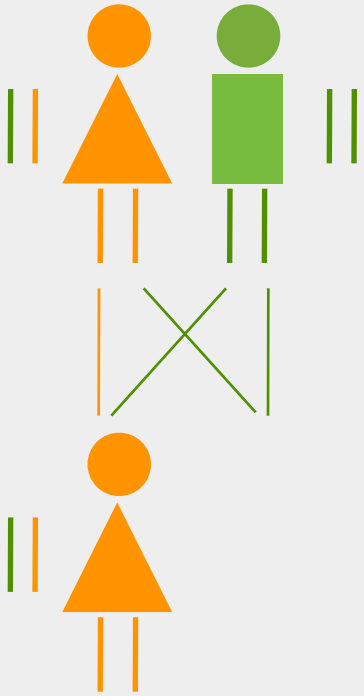

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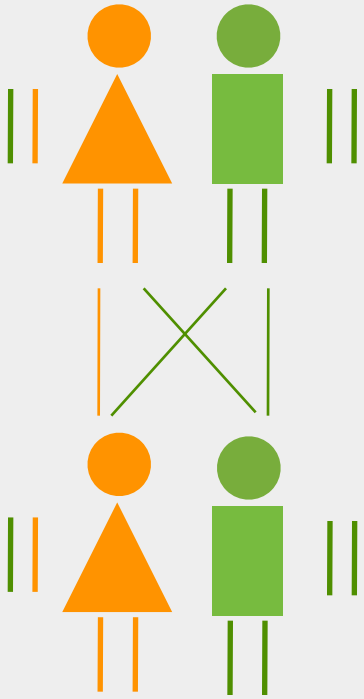

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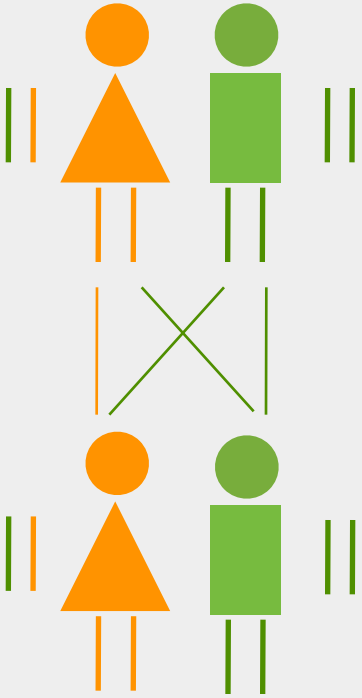

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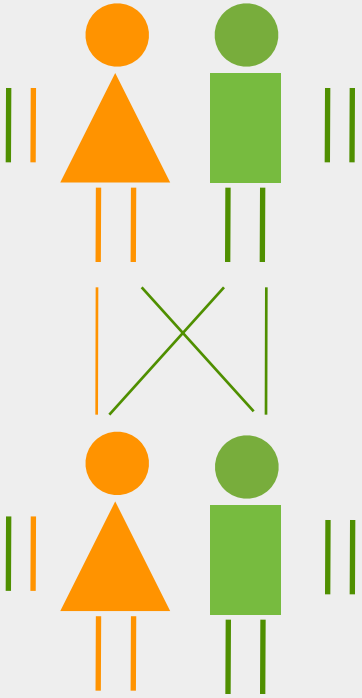

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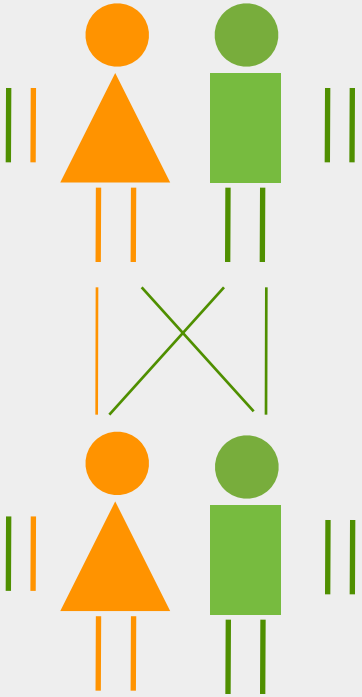

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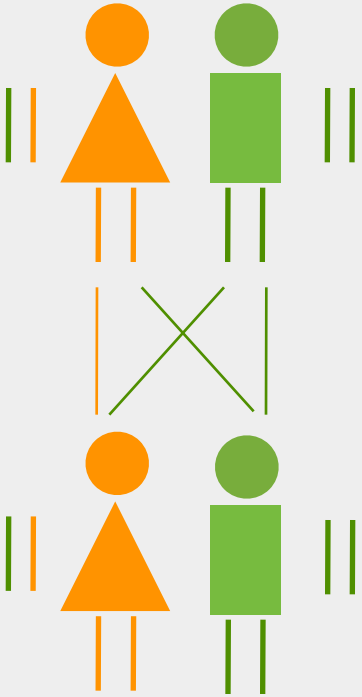

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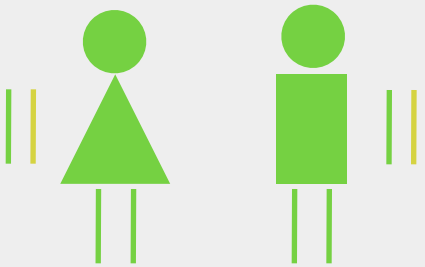

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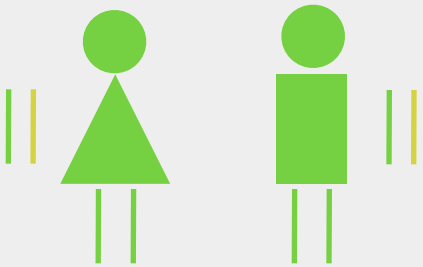

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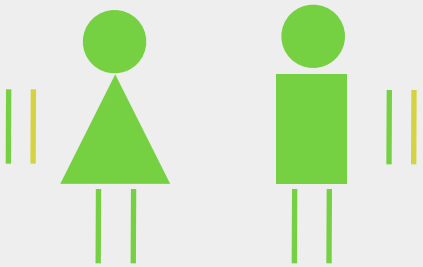

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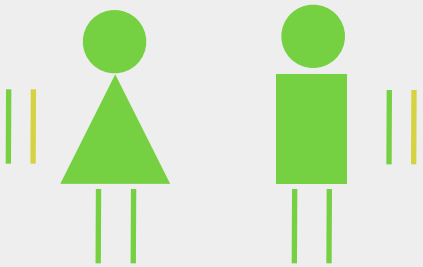

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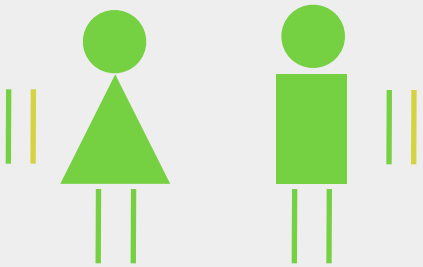

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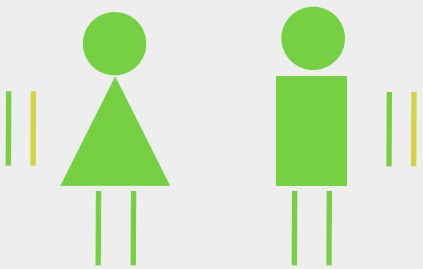

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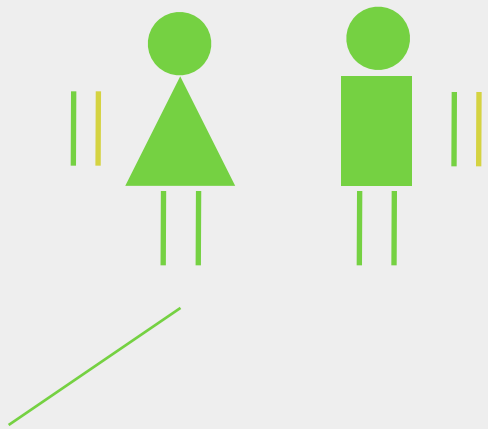

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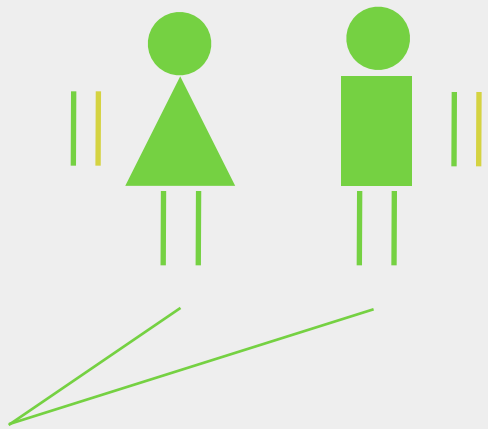

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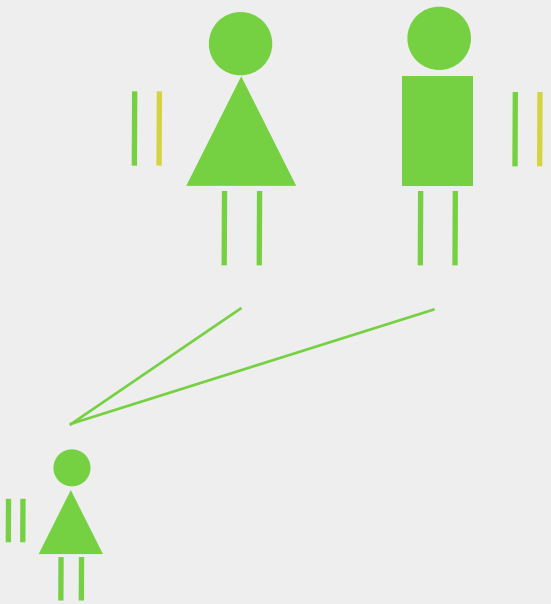

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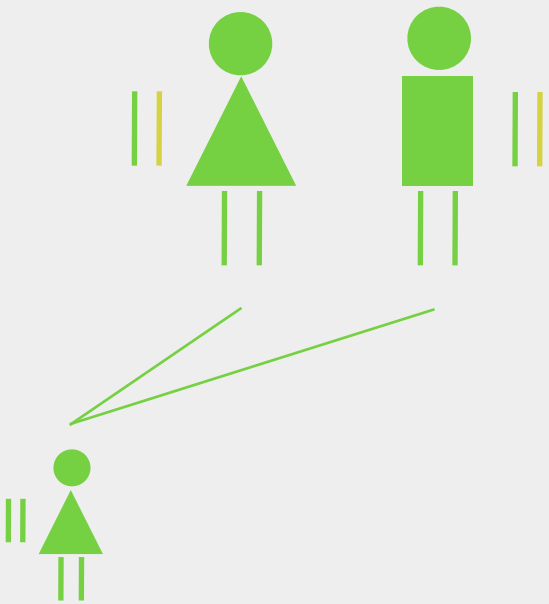

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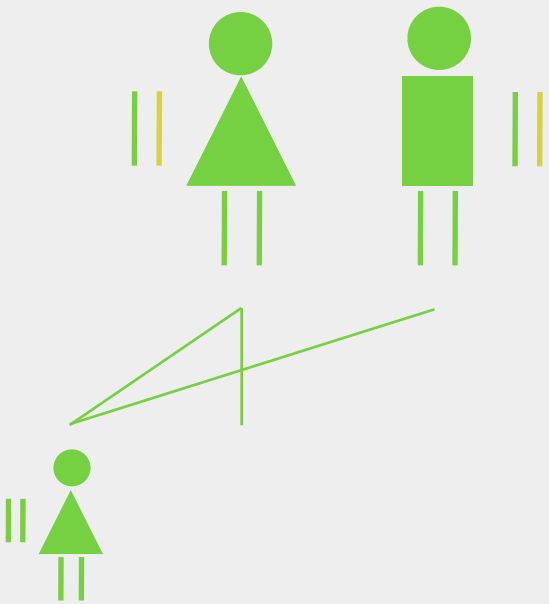

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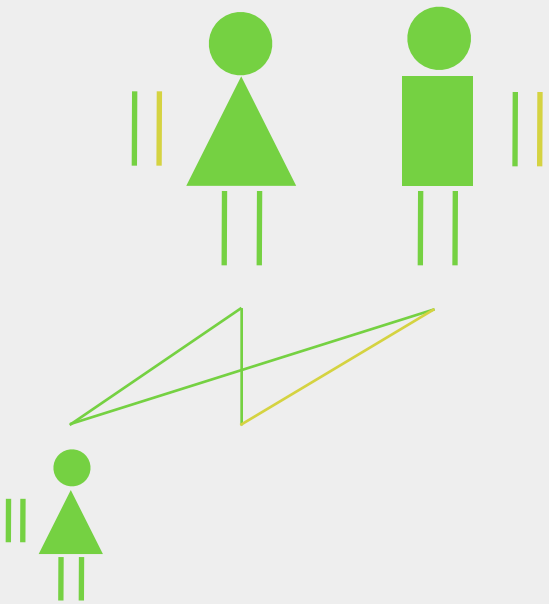

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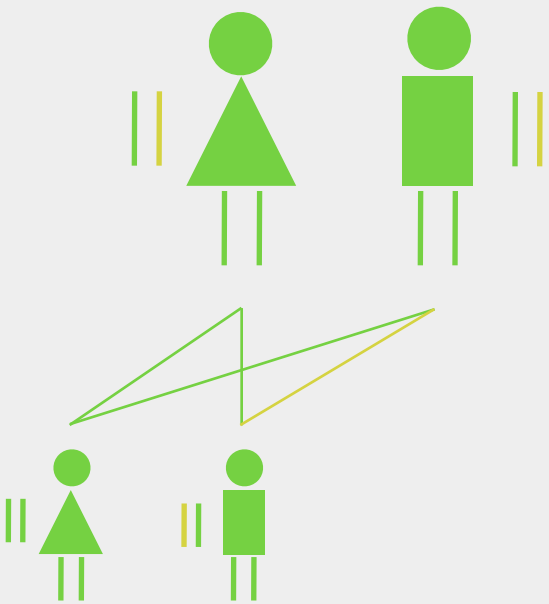

woman healthy gene + man healthy gene = healthy child, no mutated genes

woman healthy gene + man sick gene = healthy child, one mutated gene

Heredity

autosomal recessive: only 2 mutated genes cause the disease

both parents have a healthy gene (green) and a mutated one (yellow)

as the healthy gene is dominant, neither of the parents carry the disease

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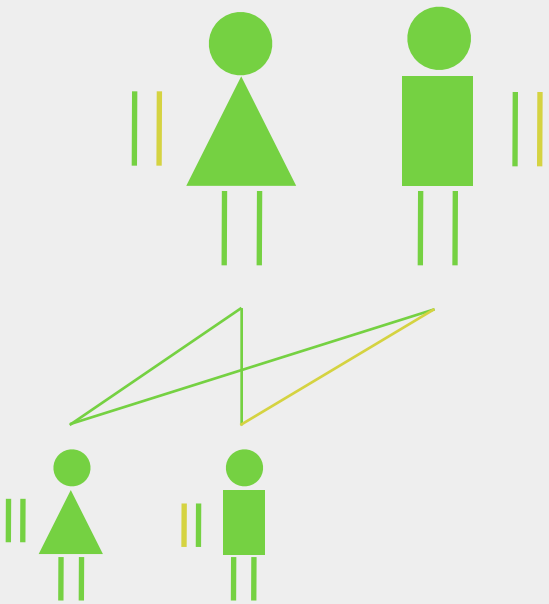

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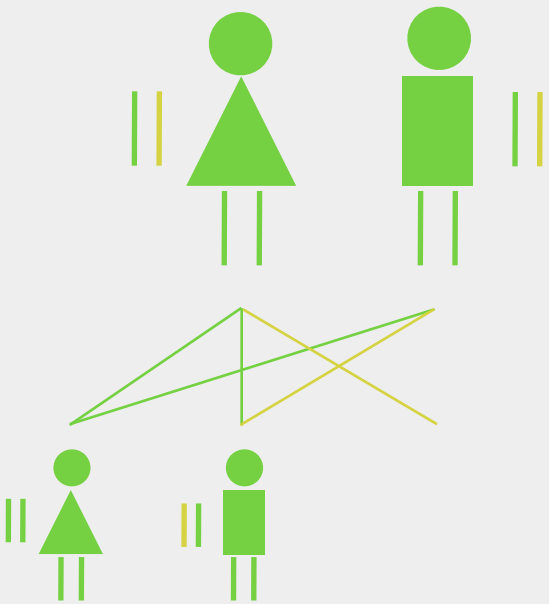

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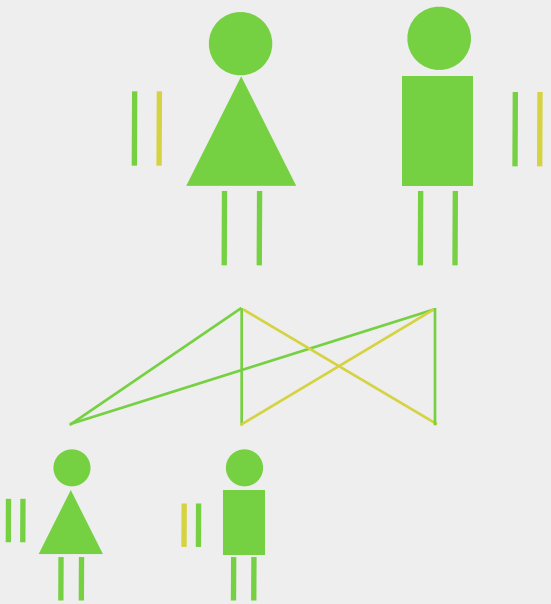

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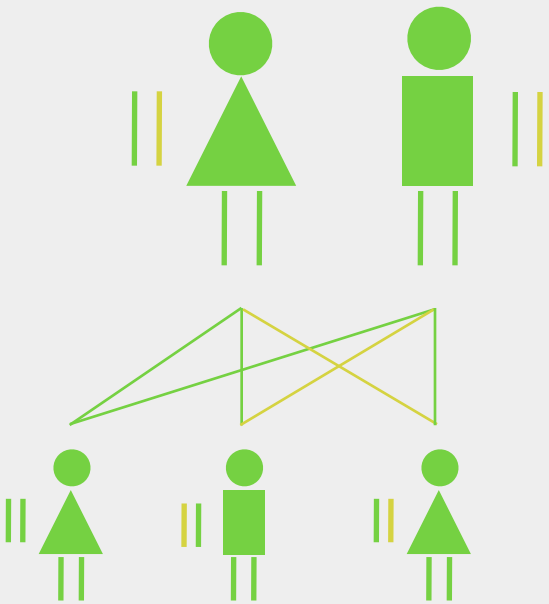

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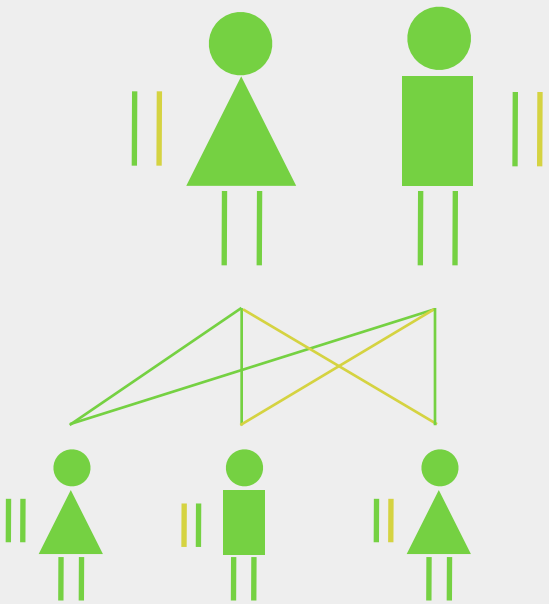

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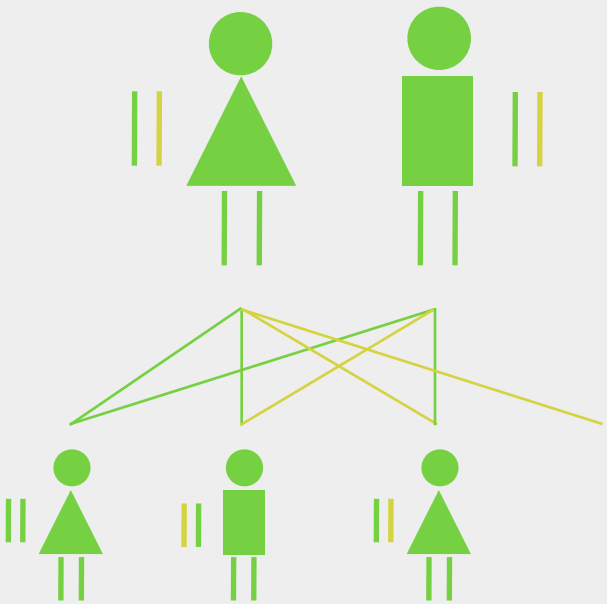

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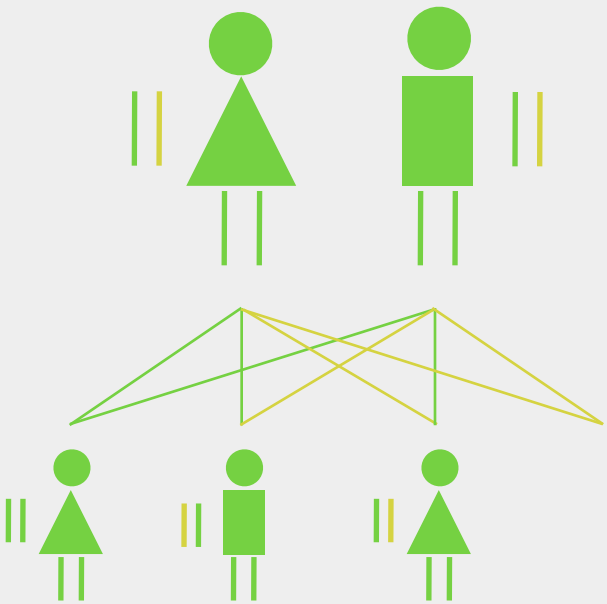

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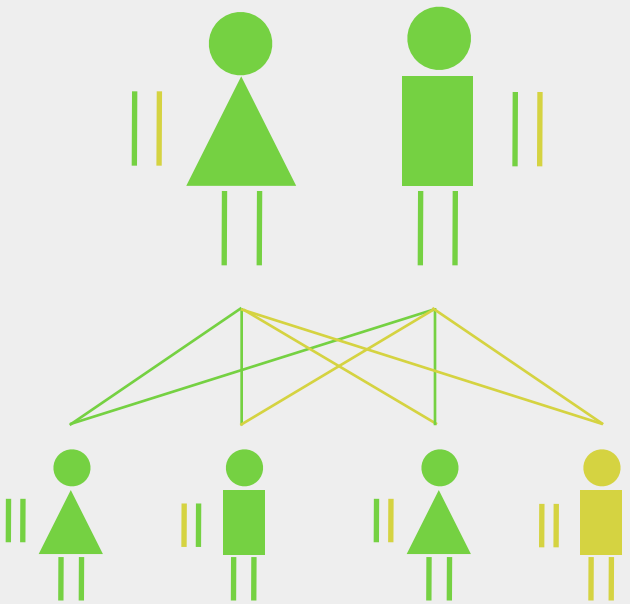

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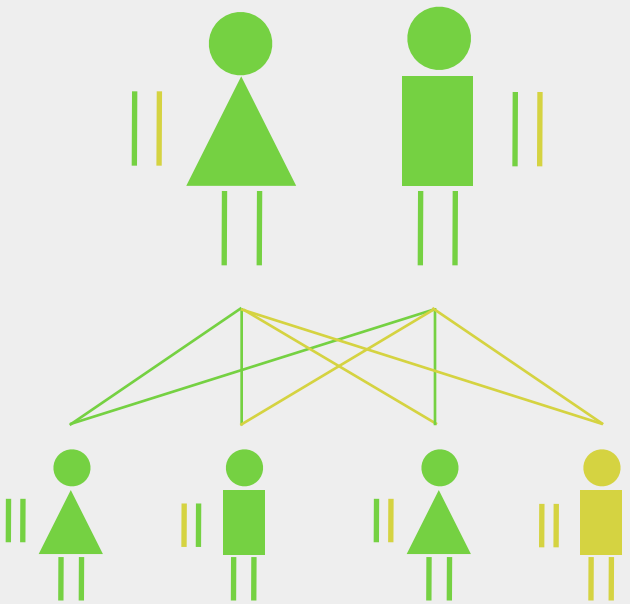

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every child has a 25% chance of inheriting the disease

Heredity

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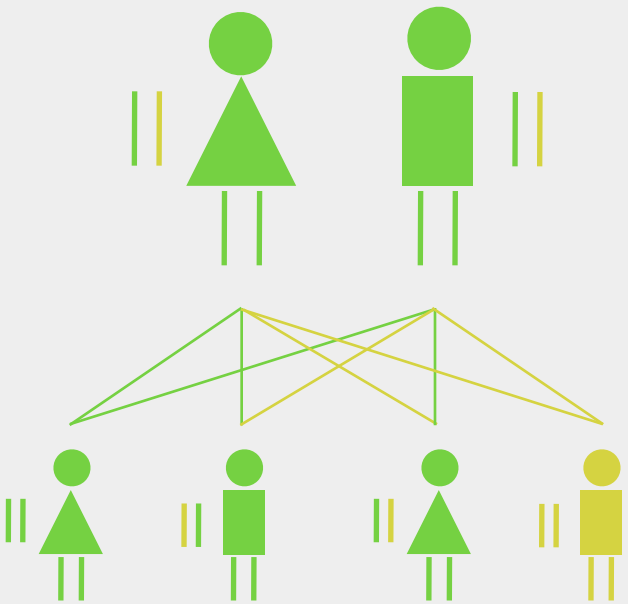

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every child has a 25% chance of inheriting the disease

whether it is a girl or a boy

Heredity

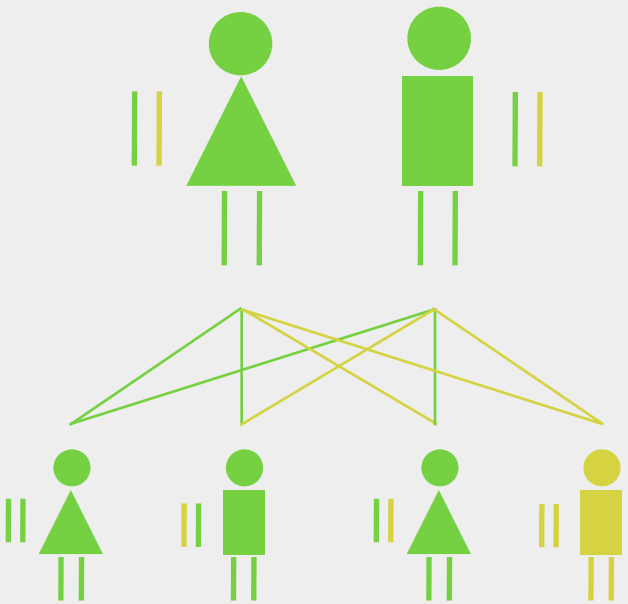
autosomal recessive: only 2 mutated genes cause the disease

both parents have a healthy gene (green) and a mutated one (yellow)

as the healthy gene is dominant, neither of the parents carry the disease

only if both parents pass on the mutated gene to their child, it will inherite the disease

there are four possibilities



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every child has a 25% chance of inheriting the disease

whether it is a girl or a boy

75% of the children has a mutated gene. they can only pass on the disease to their children if they marry a spouse with also a mutated gene

Heredity

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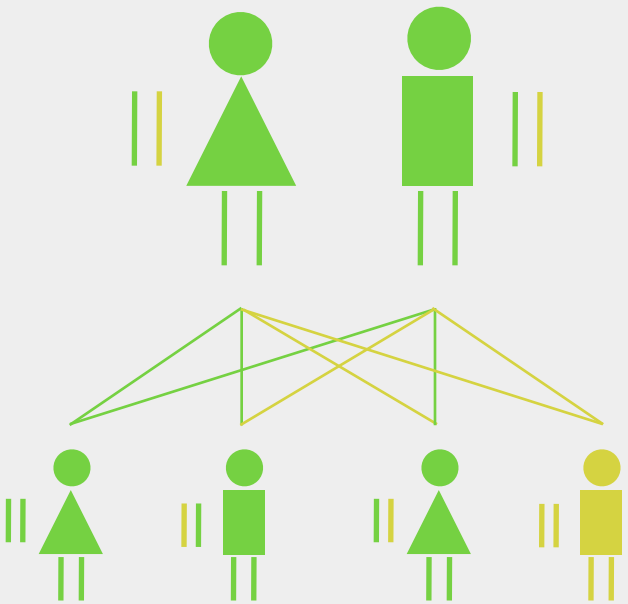

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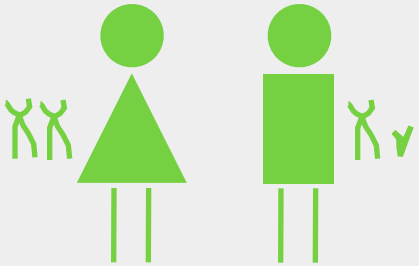
75% of the children has a mutated gene. they can only pass on the disease to their children if they marry a spouse with also a mutated gene

an example is cystic fibrosis

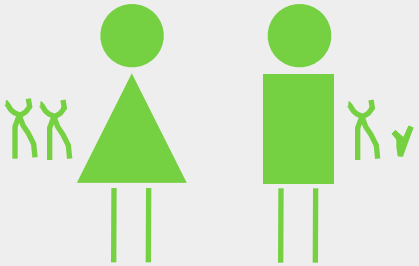
Heredity

x-linked: on the female sex chromosome, only boys at risk



x-linked: on the female sex chromosome, only boys at risk

woman: two X-chromosomes



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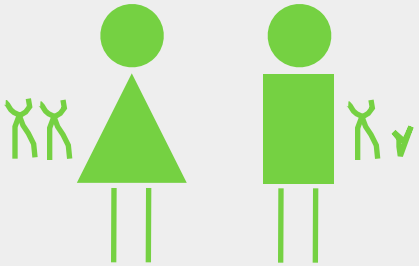
woman: two X-chromosomes

man: one Y-chromosome and one X-chromosome

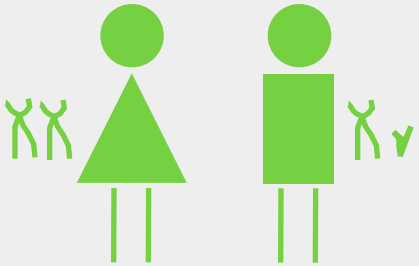


x-linked: on the female sex chromosome, only boys at risk

woman: two X-chromosomes

man: one Y-chromosome
and one X-chromosome

on the (little) Y-chromosome
there are almost only genes
that determine the gender



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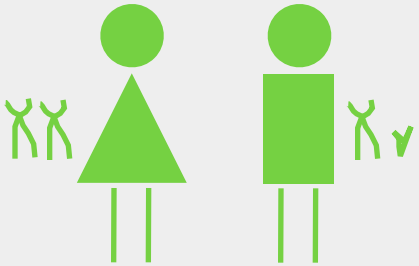
on the (little) Y-chromosome there are almost only genes that determine the gender

on the larger X-chromosome there are genes that determine the gender but also some other genes



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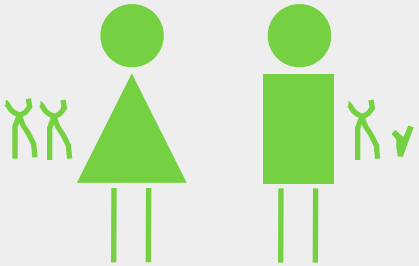

let's say that on one of the X-chromosomes of a woman there is a mutated gene

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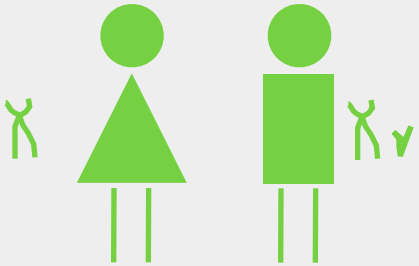

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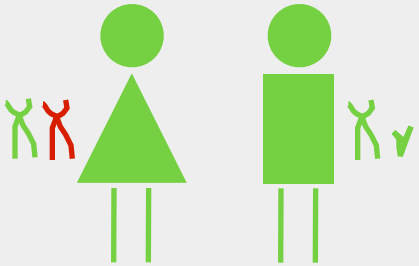

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x-linked: on the female sex chromosome, only boys at risk

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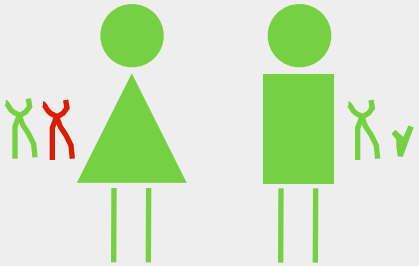

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than we have four possibilities

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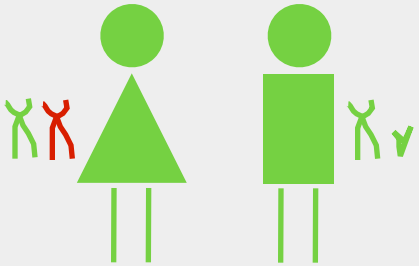

woman healthy X + man X-chromosome = healthy girl, no mutated genes

Heredity

x-linked: on the female sex chromosome, only boys at risk

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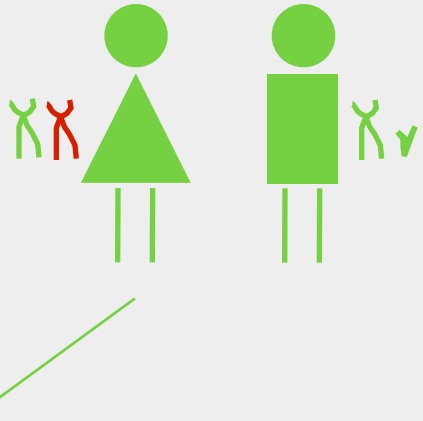

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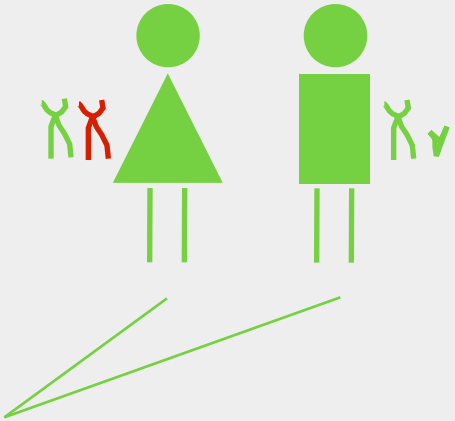

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let's say that on one of the X-chromosomes of a woman there is a mutated gene

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Heredity

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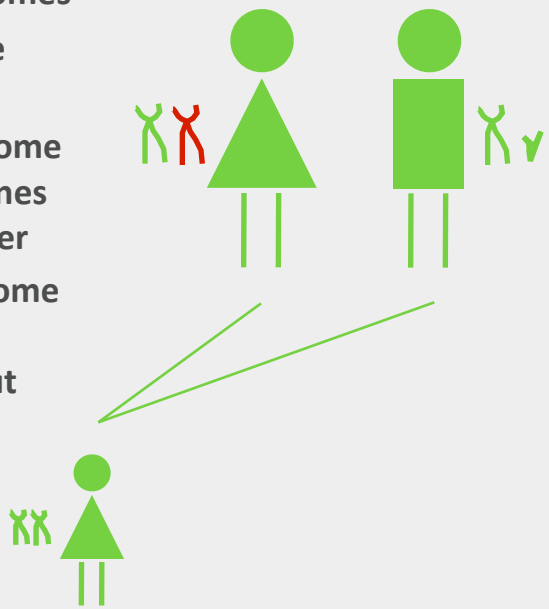

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Heredity

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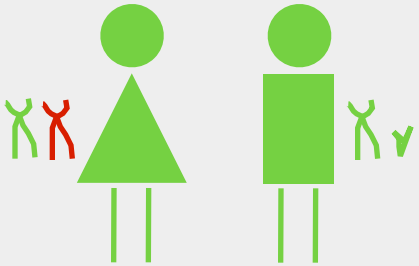

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woman healthy X + man X-chromosome = healthy girl, no mutated genes

woman sick X + man X-chromosome = healthy girl, one mutated gene the healthy X makes the girl <u>not</u> having the disease

Heredity

x-linked: on the female sex chromosome, only boys at risk

woman: two X-chromosomes

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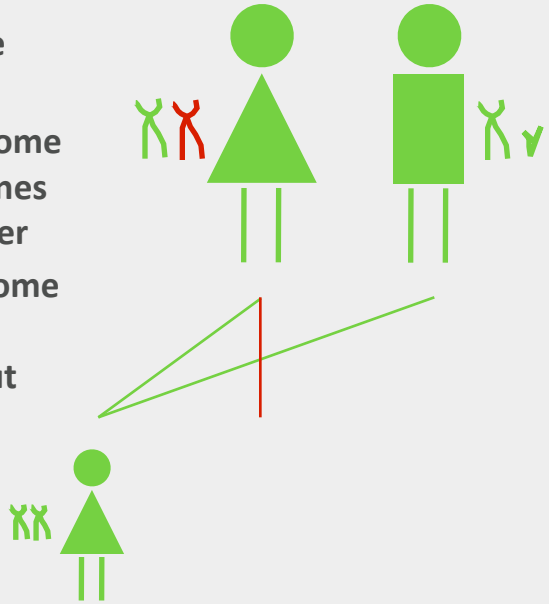

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Heredity

x-linked: on the female sex chromosome, only boys at risk

woman: two X-chromosomes

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on the (little) Y-chromosome there are almost only genes that determine the gender

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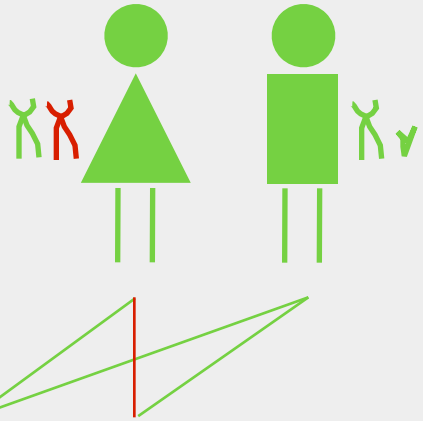

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woman sick X + man X-chromosome = healthy girl, one mutated gene the healthy X makes the girl <u>not</u> having the disease

Heredity

x-linked: on the female sex chromosome, only boys at risk

woman: two X-chromosomes

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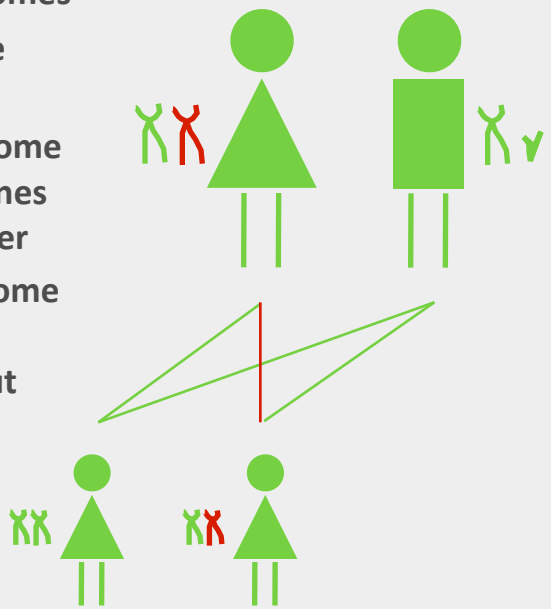

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Heredity

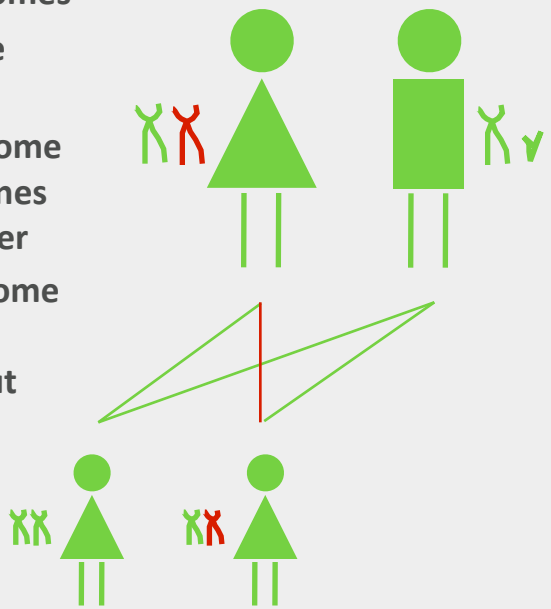
x-linked: on the female sex chromosome, only boys at risk

woman: two X-chromosomes

man: one Y-chromosome and one X-chromosome

on the (little) Y-chromosome there are almost only genes that determine the gender

on the larger X-chromosome there are genes that determine the gender but also some other genes



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than we have four possibilities

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woman sick X + man X-chromosome = healthy girl, one mutated gene the healthy X makes the girl <u>not</u> having the disease

woman healthy X + man Y-chromosome = healthy boy

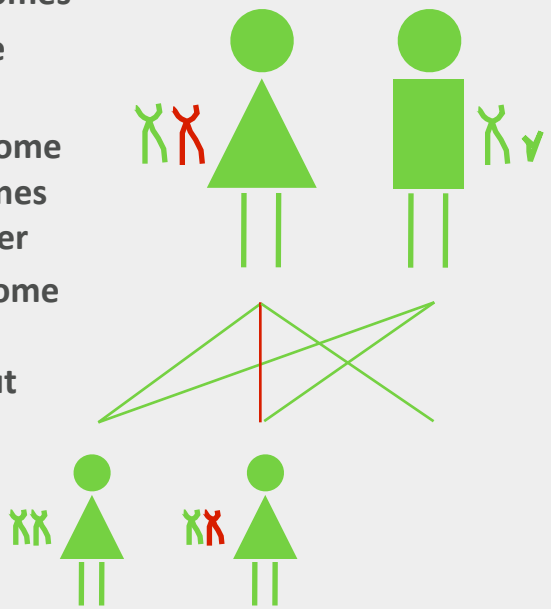
x-linked: on the female sex chromosome, only boys at risk

woman: two X-chromosomes

man: one Y-chromosome and one X-chromosome

on the (little) Y-chromosome there are almost only genes that determine the gender

on the larger X-chromosome there are genes that determine the gender but also some other genes



let's say that on one of the X-chromosomes of a woman there is a mutated gene

than we have four possibilities

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x-linked: on the female sex chromosome, only boys at risk

woman: two X-chromosomes

man: one Y-chromosome and one X-chromosome

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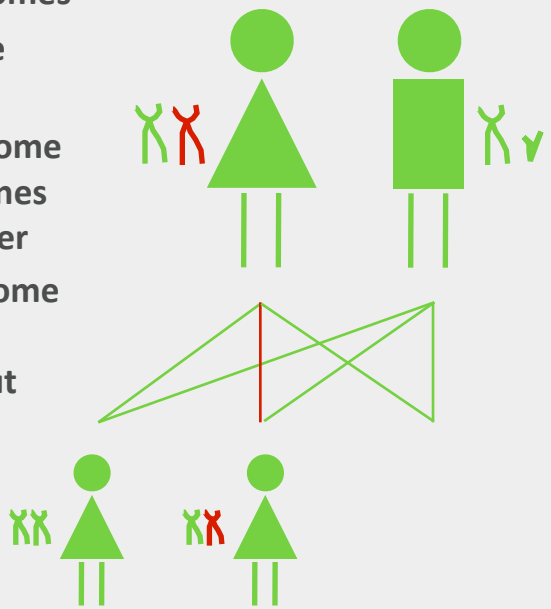

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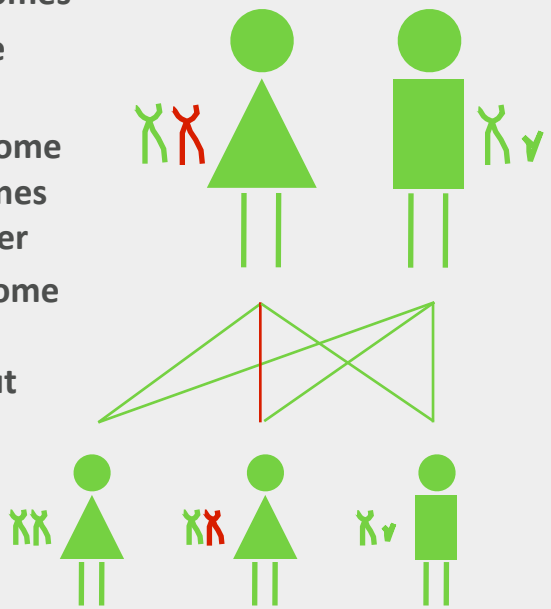

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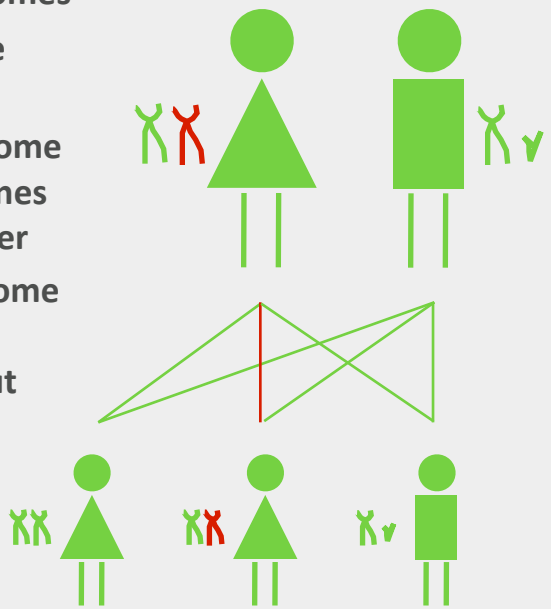

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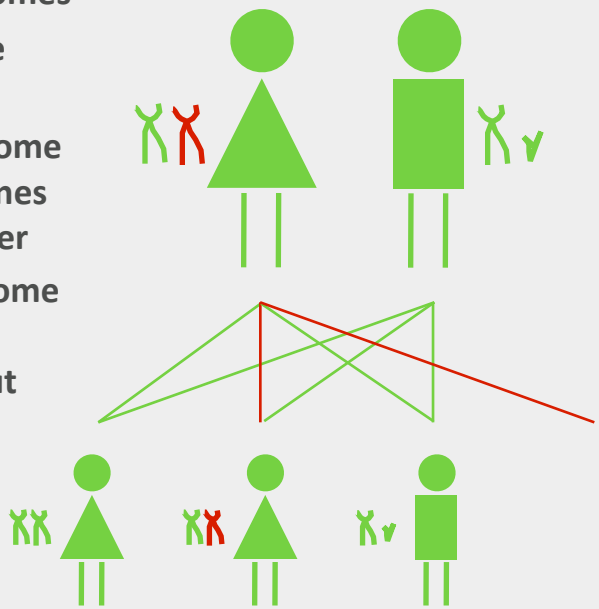

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an example is hemophilia that ran in the Russian tsar family