***I hope these notes help! Note that they may not be perfect. If you have any concerns or anything that makes you go “uhhhhh,” confirm with Mr. Boyd, or a CGS veteran!***

Tip: Start by figuring out what it is *not*

Make sure to check if the chi square value is accepted or not using the correct p-value and the distribution chart provided by the simulator!



If its less than 0.5 p value, you can just use 0.5 to find what to accept/reject



Note that chi square isn’t the determining factor of complete correctness. You can choose to see if its close enough for you to accept or not. Make sure that you include some chi-square in your reasoning.

**Autosomal Dominant/Recessive:**

* Non-sex chromosomes
* Easiest one to recognize

Dominant-

* Masks the recessive trait

Recessive-

* Two copies of an autosomal gene, one copy from each parent

**Autosomal Codominance:**

* Non-sex chromosomes
* Both alleles are expressed – 3 phenotypes
* Neither alleles are dominant or recessive
* Note: There’s no incomplete dominance in this simulator

**X-linked General**

* The women have 3 options for genotypes
* The men have 2 options for genotypes

**X – Linked Dominant/Recessive:**

* Dominant/Recessive gene is carried on the X chromosome
* Female (XX)
* Male (XY)
* If the mother has the trait there’s a 50% chance the offspring will have the trait

Dominant-

* Only one parent needs to have altered or abnormal X gene to pass it on
* Only shows in females
* If the father has the trait on an X chromosome then 100% a female offspring will express the trait

Recessive-

* Two copies of an autosomal gene, one copy from each parent
* Must be female to express trait (XX)

**X – Linked Codominance:**

* Similar to autosomal codominance, but is not autosomal (in sex chromosomes)

**Y – Linked:**

* Trait is linked to Y chromosome
* Only males can express this trait
* Males have 2 options for genotypes
* 3 total phenotypes
* Women have only 1 option for genotypes (because they cant get the Y trait)
* The y trait is the dominant one
* This is the one where you shouldn’t be too scared of sudden drops
* If you are sure that it looks y-linked, but are confused on half the population dying all of a sudden, don’t worry, that is normal for some reason, and it *is* y-linked

**One Locus: 3 alleles, 3 Phenotypes:**

* 3 Phenotypes
* A dominant over B, B dominant over C

**One Locus: 3 alleles, 4 Phenotypes:**

* 4 Phenotypes
* If you see 4 phenotypes, this is the only option
* Blood types are a good example
* 1 recessive trait

**Not heritable:**

* Has no genetic pattern
* Literal hell and chaos, no chi square will help you
* Death can still occur (“oh absolutely”)
* “the worst one”

**Autosomal Lethal general**

* Note that the lethal trait isn’t always the dominant trait.
* Most lethal genes are said to be recessive in “vocab” but I got like 2 lethal dominant genes so yeah… it doesn’t seem to be true in the simulator??? Or only 1 lethal trait not sure
* If half the population dies it *might* be lethal, but it isn’t always the determining factor. Normally the population should stay relatively close in number. Note that the populations in y-linked mode can be weirder than usual.
* 2:1 ratio is when you suspect a lethal
* There can be population fluctuations in a lethal trait.
* You know something is lethal when a genotype isn’t showing at all or when you get ratios you aren’t supposed to be seeing

**Autosomal Dominant/Recessive (AA Lethal):**

* Need 2 faulty alleles to die (having homozygous lethal genotype is deadly)
* 2 alleles can be lethal (if there are 3 alleles)
* “Dominant lethal trait” in the vocab part of the packet refers to codominance lethal. The looks (Mi, Ve etc.) of the lethal trait are generally dominant, not generally recessive.
* 2:1 ratio

**Autosomal Codominance (AA or BB Lethal):**

* 3 Phenotypes
* Causes death
* Need only 1 lethal allele to die
* (2 lethal allele also kills)

**Autosomal Lethal Gametophyte general**

* You can see the deadly trait before seeing the death that comes with the trait

**Autosomal (Male gametophyte “A” Lethal)**

* If the male has an issue it will affect all the children
* Males are the only ones that will pass the trait on
* Only needs one allele to kill
* (If female effected by trait has a male child, that male child will die)??
* Lethal phenotype shows when it gets older: if those effected reproduce before they die, they can pass it on
* Both male and female can express the trait, only male can pass it on
* Lethal trait NOT related to X or Y. It is autosomal, and in the sperm.

**Autosomal (Female gametophyte “A” Lethal):**

* If the female has an issue it will affect all the children
* Females are the only ones that will pass the trait on
* Only needs one allele to kill
* Lethal trait NOT related to X. It is autosomal, and in the egg.

Lethal Only Effects Male 3 (Or more) Phenotypes Sex Effected

Not heritable

Autosomal Dominant/Recessive

• Autosomal Dominant/Recessive (AA Lethal)

•X – Linked Dominant/Recessive

••• Y – Linked

•• X – Linked Codominance

• Autosomal Codominance

•• Autosomal Codominance (AA or BB Lethal)

•• Autosomal (Male gametophyte “A” Lethal)

•• Autosomal (Female gametophyte “A” Lethal)

• One Locus: 3 alleles, 3 Phenotypes

• One Locus: 3 alleles, 4 Phenotypes

Note: *Only* 3 phenotypes means its either some type of codominance or it is a 3 allele 3 phenotype. It can also technically be in y-linked. If there are exactly 4 phenotypes, it can only mean 3 alleles 4 phenotypes.