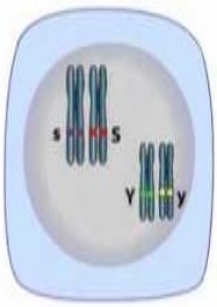
C. The Law of Independent Assortment

Amoeba Sisters & Dihybrid X https://www.youtube.com/watch?v=qIGXTJLrLf8

- Because different chromosomes are composed of different genes, allele pairs separate **independently** during the formation of gametes

  Ie. Eye Color and Tongue Rolling

  = traits are inherited independently of one another and each parent contributes 1 allele for each trait this resulting in more possible phenotypes & genotypes for offspring



- Results are shown in a **Dihybrid** Cross

  = **2 traits** crossed at one time

  :ie) In garden peas the trait for seed shape & the trait for seed color on 2 different chromosomes

  Seed Shape: **R = round; r = wrinkled**

  Seed Color: Y = yellow; y = green

Parents Genotype (P1): RRYY x rryy (remember each trait has 2 alleles)

Gametes: Parent 1: RRYY → RY, RY, RY, RY Parent 2: rryy → ry, ry, ry, ry

	RY	RY	RY	RY
ry	RrYy			
ry				
ry				
ry				

Notice: Because you are combining the same gametes each time you have the same genotype for all of the offspring. This is because each parent only produces 1 type of gamete. Do I need to fill in all of the boxes??

Results: F_1

Phenotype = **100% round and yellow**

Genotype = **100% heterozygous round and yellow (RrYy)**

= **100% dihybrid**

Cross 2 members of the F_1 generation: RrYy x RrYy

Remember, **all** possible combinations!

This is math so use **FOIL** to help you!

Gametes: Parent 1: RrYy → RY, Ry, rY, ry

Parent 2: RrYy → RY, Ry, rY, ry

	RY	**Ry**	**rY**	**ry**
RY	RRYY.	RRYy.	RrYY.	RrYy.
Ry	RRYy.	RRyy.	RrYy.	Rryy.
rY	RrYY.	RrYy.	rrYY.	rrYy.
ry	RrYy.	Rryy.	rrYy.	rryy.

Results: F_1

Phenotypes (dots): 9 round & yellow **R_Y_** 3 round & green **R_yy** 3 wrinkled & yellow **rrY_** 1 wrinkled & green **rryy**

Ratio: <u>9:3:3:1</u>

Determine the Genotypes from the phenotypes:

9 round & yellow	round & green	wrinkled & yellow	wrinkled & green
4 RrYy	2 Rryy	2 rrYy	1 rryy
2 RrYY	1 RRyy	1 rrYY	
2 RRYy			
1 RRYY			

Ratio: <u>4:2:2:1:2:1:2:1:1</u>

****Note:

The Law of Independent Assortment only applies if traits are on **<u>different chomosomes</u>**