Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Block:\_\_\_\_

**Segregation**

* Mendel found that alleles **segregated** when they formed gametes, but he wondered if they segregated \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Meaning, does \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of alleles affect the segregation of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?
	+ **Ex**. Does the gene that determines seed shape have anything to do with seed color?
	+ Will a round seed always be yellow?

**Two Different Genes**

* To answer these questions, Mendel performed an experiment to follow two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ genes as they passed from one generation to the next.
* This experiment is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (or two-factor cross)

**Two-Trait Cross**

* Mendel crossed *true-breeding* plants that produced only **round yellow** peas with plants that produced only **wrinkled green** peas \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (genotypes).
* All of the offspring were **yellow** and **round**. ☹
	+ This told us nothing we didn’t already know – that yellow and round peas were dominant over wrinkled and green.
* We still didn’t know if the two genes were \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Mendel knew that all of the plants in the F1 generation would be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for both seed color and seed shape (RrYy)
* But he didn’t know if the dominant alleles would always stay together (RY), or if they would assort independently--- meaning that *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* of alleles was possible.
* To Find out, he crossed the offspring of the F1 generation to produce the F2 generation

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_x\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (genotype)

**How Did He Get Those Letters?**

 Mother (RrYy) Father (RrYy)

|  |  |
| --- | --- |
|  |  |
|  |  |

|  |  |
| --- | --- |
|  |  |
|  |  |



**The Results:**

* The F2 plants produced 556 seeds!
* Of those, 315 were yellow and round and 32 were wrinkled and green – the combinations found in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* BUT, 209 of the seeds had combinations of phenotypes (and therefore \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) not seen in either parent!

**Independent Assortment:**

* The appearance of NEW phenotypes in the F2 plants could only mean one thing: The genes for seed \_\_\_\_\_\_\_\_\_\_\_\_\_\_ segregated independently of those for seed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!
* This showed that genes for a trait, like seed color, don’t \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of genes for other traits.
* This became known as the **principle of independent assortment**
* *Independent assortment helps account for the many genetic variations seen in plants and animals!*

**The Golden Ratio**

* Mendel found that anytime he crossed two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for two different traits, no matter the number of offspring, the ratio of phenotypes was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* **9** – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ phenotype for both traits
* **3** – dominant phenotype for one trait, recessive for the other
* **3** – reverse that
* **1**- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ phenotype for both traits

**Summary of Mendel’s Principles**

* The inheritance of biological characteristics is determined by individual units known as genes. Genes are passed from parent to offspring.
* In cases in which two or more forms (\_\_\_\_\_\_\_\_\_\_\_\_\_) of the gene for a single trait exist, some forms of the gene may be dominant and others may be recessive.
* In most sexually reproducing organisms, each adult has \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of each gene – one from each parent. These genes are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from each other when gametes are formed.
* The alleles for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ genes usually segregate independently of one another.