*Fold along the line and glue this side down in your Biology Interactive Learning Log (BILL)*



**Unit 6: Mendel & Genetics** 

**Learning goals:** Long before humans discovered DNA, we were studying the effects genes had on organisms (traits) and how these characteristics were passed down from parent to offspring. Gregor Mendel, the *father of genetics*, studied, analyzed, and understood inheritance worked in a systemic and rational manner, allowing us to predict offspring traits using Punnett squares and probabilities. His curiosity led him to explore inheritance in pea plants, and he proposed that each trait was passed on in a single unit (a gene) rather than offspring being a true blend of their two parents. Later, scientists discovered how chromosomes that carried genes were distributed between sex cells to produce unique gametes: meiosis. Errors in chromosome distribution, evident in karyotypes, result in disorders caused by chromosomal mutations.

 **Key concepts:**

Mendel’s experiments Independent assortment Punnett squares

Probability Chi-square test Karyotyping

 Dominant & recessive alleles Chromosome mutations

Can you show what you know?

**Essential Questions:**

1. How does an organism inherit its unique traits?
2. How are alleles of the same gene distributed to offspring?
3. How do alleles segregate when more than one gene is involved?
4. How can two alleles from different genes be inherited together?
5. How can Punnett squares be used to predict offspring phenotypes and genotypes?
6. How does a chi-square test help scientists determine if data obtained in a genetic cross follow ratios expected based on Mendel’s Principles?
7. How is a karyotype used to diagnose genetic conditions?

Vocabulary**:** (**+**) = Can explain it; (**-**) = Only heard it; **0** = No idea

**Study Guide - What I Need to Know/Be able to do:**

* + - 1. **Identify** the 5 types of chromosome disorders from an abnormal karyotype.
			2. **Differentiate** between trisomy, monosomy, aneuploidy, euploidy, and diploidy.
			3. **Explain** how X-inactivation is responsible for calico cats and what the effects are to humans.
			4. **Describe** Mendel’s studies and conclusions about inheritance.
			5. **Explain** how geneticists use the principles of probability to make Punnett squares.
			6. **Explain** the principles of dominance, segregation, and independent assortment and how each relates to meiosis and inheritance of traits.
			7. **Describe** how alleles from different genes can be inherited together.
			8. **Demonstrate** the ability to figure phenotypic and genotypic probability percentages and ratios for Punnett square problems.
			9. **Demonstrate** the ability to perform a monohybrid and a dihybrid cross.
			10. **Perform** Chi-square analysis of offspring ratios to demonstrate how traits are inherited.
			11. **Explain** how and why a test cross is performed.

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| **Term** | **Pre** | **Post** | **Memory Clue** |
| amniocentesis |  |  |  |
| karyotype |  |  |  |
|  autosome |  |  |  |
| nondisjunction |  |  |  |
| monosomy |  |  |  |
| trisomy |  |  |  |
| euploidy |  |  |  |
| aneuploidy |  |  |  |
| translocation |  |  |  |
| inversion |  |  |  |
| duplication |  |  |  |
| deletion |  |  |  |
| genetics |  |  |  |
| allele |  |  |  |
| locus |  |  |  |
| genotype |  |  |  |
| phenotype |  |  |  |
| gene |  |  |  |
| homozygous |  |  |  |
| heterozygous |  |  |  |
| hybrid |  |  |  |
| cross-pollination |  |  |  |
| self-pollination |  |  |  |
| Gregor Mendel |  |  |  |
| Principle of dominance |  |  |  |
| Principle of segregation |  |  |  |
| Principle of Independent assortment |  |  |  |
| Chi-square analysis |  |  |  |
| Test cross |  |  |  |
|  |  |  |  |
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