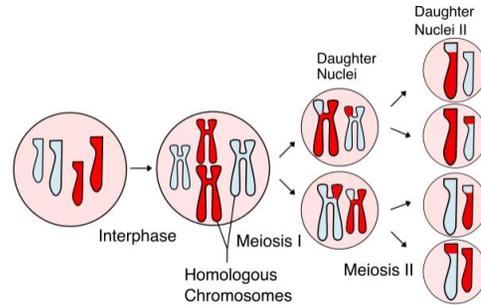
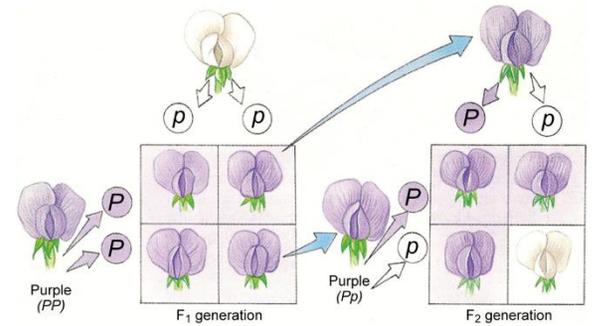


# Unit 6: Genetics & Meiosis

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

**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



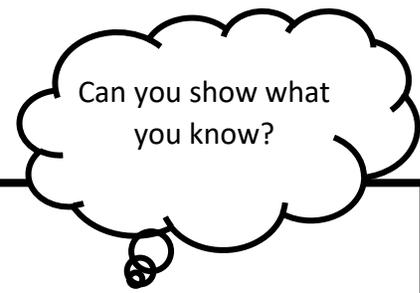
squares and probabilities. His curiosity led him to explore inheritance in pea plants, and he proposed that each trait was passed on in a single unit (a gene) rather than offspring being a true blend of their two parents. Later, scientists discovered how chromosomes that carried genes were distributed 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  
Dominant & recessive alleles  
Chromosome number  
Segregation

Independent assortment  
Meiosis  
Homologous chromosomes  
Gene linkage

Punnett squares  
Probability  
Chi-square test



## Essential Questions:

1. How does an organism get its unique traits?
2. How does the Blending Hypothesis differ from Mendelian genetics?
3. How are alleles of the same gene distributed to offspring?
4. How can Punnett squares be used to predict offspring phenotypes and genotypes?
5. How do alleles segregate when more than one gene is involved?
6. How many sets of genes are found in most adult organisms?
7. What events occur in each phase of meiosis?
8. How is meiosis different from mitosis?
9. How can two alleles from different genes be inherited together?
10. What is a karyotype?

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

Term	Pre	Post	Memory Clue
1. genetics			
2. fertilization			
3. trait			
4. hybrid			
5. F1 generation			
6. F2 generation			
7. true-breeding			
8. cross pollination			
9. gene			
10. allele			
11. locus			
12. Principle of dominance			
13. Principle of segregation			
14. gamete			
15. homologous chromosome			
16. diploid number			
17. haploid number			
18. meiosis			
19. tetrad			
20. crossing-over			
21. zygote			
22. polar body			
23. oogenesis			
24. spermatogenesis			
25. probability			
26. homozygous			
27. heterozygous			
28. phenotype			
29. genotype			
30. Punnett square			
31. Principle of Independent Assortment			
32. karyotype			
33. autosome			
34. sex chromosome			
35. genome			

- What I Need to Know/Be able to do:**
- **Describe** Mendel's studies and conclusions about inheritance.
  - **Describe** what happens during segregation.
  - **Explain** how geneticists use the principles of probability to make Punnett squares.
  - **Explain** the principle of independent assortment.
  - **Explain** how Mendel's principles apply to all organisms.
  - **Explain** a monohybrid and a dihybrid cross.
  - **Describe** the results (second generation) of Mendel's monohybrid cross.
  - **Determine** which trait is dominant and how it is inherited.
  - **Perform** Punnett square and Chi-square analysis of offspring ratios to demonstrate how traits are inherited.
  - **Demonstrate** the ability to figure phenotypic and genotypic probability percentages and ratios for Punnett square problems.
  - **Contrast** the number of chromosomes in body cells and in gametes.
  - **Summarize** the events of meiosis.
  - **Describe** how crossing over provides genetic variation.
  - **Explain** sexual reproduction and why it has an evolutionary advantage.
  - **Compare and contrast** oogenesis and spermatogenesis.
  - **Contrast** meiosis and mitosis.
  - **Describe** how alleles from different genes can be inherited together.
  - **Identify** the types of human chromosomes in a karyotype.