

Genetics and Heredity

Scope and Sequence

- **Introduction**
- **DNA Expression and Observable Traits**
 - **The Role of DNA in Living Things**
 - **Homologous Chromosomes**
 - **Genes Exist in Different “Flavors”**
 - **Activity: Genotype/Phenotype Review**
 - **Activity: Personal Trait Survey**
- **Gregor Mendel and the Principles of Mendelian Genetics**
 - **Gregor Mendel: The Father of Modern Genetics**
 - **Mendel’s Contributions to our Understanding of Genetics**
- **Meiosis and Patterns of Mendelian Inheritance**
 - **Meiosis Step-by-Step, Crossing Over, and Gametogenesis**
 - **Meiosis I**
 - **Meiosis II**
 - **Summary of Meiosis**
 - **Gametogenesis**
 - **Segregation and Independent Assortment of Alleles During Meiosis**
 - **Punnett Squares**
 - **Monohybrid Crosses**
 - **Activity: Practice Using Punnett Squares to Predict the Outcome of Monohybrid Crosses**
 - **Dihybrid Crosses**
 - **Activity: Practice Using Punnett Squares to Predict the Outcome of Dihybrid Crosses**

- **Genetic Variation as a Result of Meiosis**
 - **Crossing Over, Revisited**
 - **Independent Assortment of Homologous Chromosomes During Meiosis**
- **The Difference Between Probability and Real Life**
 - **Activity: Cystic Fibrosis Coin Toss (Demonstrating Probability vs. Outcome)**
- **Patterns of Non-Mendelian Inheritance**
 - **Sex-linked Traits**
 - **Activity: Creating a Family Pedigree**
 - **Activity: Using Punnett Squares to Predict the Outcome of Crosses Involving Sex-linked Traits**
 - **Mitochondrial DNA**
 - **Incomplete Dominance**
 - **Optional Activity: PTC Paper Test**
 - **Codominance**
 - **Calico Cats: an Example of Sex-linked Codominance**
 - **The Genetics of Human Blood Types**
 - **The Human ABO Blood Antigen System**
 - **Activity: Punnett Square Practice Using ABO Blood Types**
 - **The Human Rh Blood Antigen System**
 - **Activity: Punnett Square Practice: Dihybrid Crosses with ABO and Rh Antigen Systems**
 - **Why it's Important to Know Your Blood Type**
 - **How to Determine Blood Type**
 - **Optional Activity: Determining Your Blood Type**

- **Polygenic Inheritance**
- **Concluding Remarks**
 - **Chromosomal Non-disjunction**
 - **Epigenetics: the Role Environment Plays in Gene Expression**
 - **Gene Therapy**
 - **Genome Editing**
 - **Conclusion**