**Unit Six – Classical Genetics**

**Honors Biology Student Learning Targets**

**(Textbook sections: 6.3 – 6.6, 7.1 – 7.4, & 9.6)**

**Always know vocabulary!!!**

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**6.1 Explain the history of genetics, or the study of genes and how traits are inherited. (p. 167 – 169)**

* 6.1.A. Describe Gregor Mendel’s experiments and his contributions to genetics.
* 6.1.B Explain how Mendel’s data disproves the blending hypothesis.
* 6.1.C Compare purebred (true bred) and hybrid organisms, including the role of self-pollination.
* 6.1.D Discuss Mendel’s research and how the data from his experimental plant crosses showed patterns between the Parental (P) and the following F1 and F2 generations.

* 1. **State the two main conclusions within Mendel’s Law of Segregation (p. 169)**
* 6.2.A Define the discrete units of inheritance that Mendel refers to in his work.
* 6.2.B Explain why gametes have only one version of each gene, given the movement of chromosomes during meiosis.
  1. **Understand how genes come in many different forms and how those work together to determine physical characteristics. (p. 170 – 172)**
* 6.3.A. Describe where genes are found, what they code for, and what their various forms are called.
* 6.3.B Differentiate between homozygous and heterozygous combinations of alleles and how they relate to the phenotype of an organism.
* 6.3.C Use knowledge of protein synthesis to relate genotypes and phenotypes of an organism.
* 6.3.D Compare dominant and recessive alleles and explain when they are or are not expressed in phenotypes.

* 1. **Model genetic crosses with attention to one gene (monohybrid) by using Punnett squares to predict possible offspring genotypes and phenotypes given any two parental genotypes. (p. 173 – 175)**
* 6.4.A Perform accurate Punnett squares and explain their effectiveness given the process of meiosis.
* 6.4.B Analyze genetic crosses using ratios to describe genotypic and phenotypic probabilities.
* 6.4.C Explain how carriers don’t show disease symptoms, but can have offspring with symptoms.
  1. **Explain what a testcross is and when it would be used. (p. 175)**

* 1. **Model genetic crosses concerning two genes on different chromosomes (dihybrid) by using Punnett squares to predict possible offspring genotypes and phenotypes given any parental genotypes. (p. 176)**
* 6.6.A. Perform a dihybrid cross accurately with either unknown parental or offspring genotypes.
* 6.6.B Analyze genetic crosses using ratios to describe genotypic and phenotypic probabilities.
* 6.6.C Explain Mendel’s law of Independent Assortment as it relates to meiosis and a dihybrid cross. (Hint: locate the possible gametes of each parent. Explain why each gamete has two alleles.)

* 1. **Explain why offspring produced by sexual reproduction are genetically diverse. (p. 179 – 181; 198)**
* 6.7.A. Define Mendel’s law of independent assortment.
* 6.7.B Explain how the probabilities of independent assortment and fertilization lead to genetically diverse offspring.
* 6.7.C **(HONORS)** Describe crossing over as it relates to genetic diversity and gene recombination.
* 6.7.D **(HONORS)** Explain how distance between genes effects the likelihood that they will be inherited together.

* 1. **Understand how a gene’s location (autosomal / sex chromosome) effects gene expression. (p. 188 – 191)**
* 6.8.A. Explain the differences in inheritance patterns of autosomal and sex-linked genes.
* 6.8.B Discuss why carrier status is an issue with sex-linked disorders.
* 6.8.C Explain how a trait being sex-linked affects the numbers of male/ female affected offspring in a cross.

* 1. **Explain how phenotype can depend on more complicated interactions of alleles and describe these patterns of inheritance. (p. 192 – 194)**
* 6.9.A. Compare and contrast the resulting phenotypes found in traits that have codominance and incomplete dominance inheritance patterns.
* 6.9.B Explain the inheritance patterns of polygenic traits and the resulting range in phenotypes of offspring.
* 6.9.C Perform a multiple allele cross to determine the blood type of offspring or their parents.
* 6.9.D **(HONORS)** Perform genetic crosses involving any combination of traits with codominance, incomplete dominance, multiple allele, and polygenic inheritance patterns.
  1. **Explain the role of the environment in determining an organism’s phenotype. (p. 195)**
  2. **Draw a pedigree to trace inherited genes if given information about a family. (p. 200 – 204 )**
* 6.11.A Describe how a pedigree is used to map genetic inheritance.
* 6.11.B Predict possible genotypes and phenotypes for family members of a pedigree.
* 6.11.C Explain how females can carry sex-linked disorders, which can be identified by pedigrees.
* 6.11.D **(HONORS)** Use the information given in a family pedigree to identify the inheritance pattern of a gene, whether autosomal or sex-linked.
  1. **Explain how genetic screening can detect genetic disorders and counseling can advise patients about genetic disorders and their inheritance probabilities. (p. 268)**

**Scientific Skills Learning Targets**

*These are skills that are used repeatedly through all units and do not correspond to any one particular unit.*

*Refer to scientific skills introduced and practiced in previous units on those learning targets.*

\_\_\_\_**SS.8** Identify primary and summary research articles, explain the different purposes for these types of articles, and read these articles for understanding

\_\_\_\_**SS.9** Apply concepts of statistics and probability to support or refute scientific explanations.

