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| **Students will understand**   * The sequences following the Inheritance of One Gene-Segregation and the process of two-genes inheritance - Independent Assortment. * Homozygote has two identical alleles, and heterozygote has two different alleles. * The alleles expressed a heterozygote is dominant and the allele not expressed is recessive. * Autosomal dominant traits do not skip generation and affect both sexes; autosomal recessive traits can skip generation and can affect both sexes. * The traits inherited on sex chromosomes. * Knowing the human genome sequence has made it possible to analyze more than one gene at a time. * Pedigrees and Punnett squares are tools that apply Mendel’s first law to predict the recurrence risks of inherited disorders or traits. * A cell contains many mitochondria, which have many copies of the mitochondrial genome; mitochondrial genes are maternally inherited and mutate rapidly. * Mendel’s first law can be used to solve problems involving X-linked genes. * Genes and environmental factors frame most traits * Heritability measures the genetic contribution to a multifactorial trait; it is specific to a particular population at a particular time. * The mechanisms used to investigate multifactorial traits * Population that suddenly become sedentary and switch to fatty diet reflect environmental influence on the body. * The genes products responsible for variation in behaviors. * Most behavioral traits and disorders are common, polygenic and multifactorial. | **Essential Questions:**   1. What are the sequences following the Inheritance of One Gene-Segregation and the two- genes inheritance - Independent Assortment work? 2. How was Mendel able to derive the two laws of inheritance without knowing about chromosomes? 3. What is the probability that the two individuals with an autosomal recessive trait will have a child with the same genotype and phenotype as they do? 4. How is sex expressed at chromosomal, phenotypic, and gender identity levels? 5. Why is it unlikely that a woman who is homozygous for an X-linked dominant condition? 6. What traits inherited on sex chromosomes? 7. How do genes and the environmental factors frame most traits? 8. What method is used to investigate multifactorial traits? 9. What is the difference between Mendelian multifactorial traits and polygenic multifactorial traits? 10. Which has greater heritability-eye color or height? 11. What types of genes products are responsible for variation in behaviors? 12. Why is the genetics of ADHD easier to analyze than that of autism? 13. Why is identifying a candidate gene is the first step to understanding how behavior appears and varies among individuals? |

**Sub-Unit Components/Sub-Headings/Objectives**

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| Following the Inheritance of One Gene-Segregation   * Mendel and Man * Mendel’s Experiments * Terms and Tools to Follow Segregating Genes | Single Gene Inheritance in Humans   * Following the Inheritance of Two Genes-Independent Assortment * Pedigree Analysis | Extensions and Exceptions to Mendel’s Laws   * When Gene Expression Appears to Alter Mendelian Ratios * Maternal Inheritance and Mitochondrial Genes * Linkage | Matter of Sex   * Sexual Development * Traits Inherited on Sex Chromosomes * X Inactivation Equalizes the sexes * Sex-Limited and Sex-Influenced Traits * Genomic Imprinting | Multifactorial Traits   * Genes and the Environments mold most traits * Methods used to Investigate Multifactorial Traits * Two Multifactorial Traits | The Genetics of Behavior   * Genes Contribution to most behavioral traits * Eating Disorders * Sleep * Intelligence * Drug Addiction * Mood Disorders * Schizophrenia |

**Knowledge—Students will know…**

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| 1. Define, interpret, and use unit vocabulary 2. Describe the sequences following the Inheritance of One Gene-Segregation 3. Explain how autosomal dominant traits and autosomal recessive traits affect both sexes 4. Describe the process of single-gene inheritance in humans 5. Describe the process of two-genes inheritance - Independent Assortment 6. Explain pedigree analysis 7. Explain how gene expression appears to alter Mendelian ratios 8. Describe How the maternal inheritance and mitochondrial genes work 9. Explain Linkage in human genetics 10. Explain why the inheritance of mitochondrial DNA and linkage are the exception to Mendel’s laws? 11. Describe the sexual development 12. Evaluate traits inherited on sex chromosomes 13. Describe and evaluate sex-limited and sex-influenced traits 14. Explain how does X inactivation even out the amounts of X-linked genes between the sexes 15. Describe and evaluate genomic imprinting 16. Evaluate how genes and the environment frame most traits 17. Distinguish between a Mendelian multifactorial trait and a polygenic trait 18. Evaluate the mechanisms used to investigate multifactorial traits 19. Evaluate the genes products responsible for variation in behaviors 20. Describe and apply two multifactorial traits |

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| **Standards** | **Assessments/Evidence** |
| *List the standards set used and the individual standards to be taught and assessed. Highlight or* ***Bold*** *the standards of significance.* Example:   * HS-LS1-1: Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. * HS-LS1-2: Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. * HS-LS1-3: Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. | **Which assessments will provide the best evidence of meeting the learning objectives? Consider the DOK required.**   * Bell-Ringer * Journal Activities * Exit-Slips * Exams * Quizzes * Small Group (Team Activities) * Experiments * Projects * Presentations * Case Studies * Vocabulary |

**Reading and Writing Standards (except for English/Language Arts courses)**

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| Include at least one CCSS Literacy and one Writing standard that will be taught and assessed. Access them with these links and then list below:   * [CCSS.ELA-Literacy.RST.9-10.8](http://www.corestandards.org/ELA-Literacy/RST/9-10/8/) Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.  * [CCSS.ELA-Literacy.RST.9-10.9](http://www.corestandards.org/ELA-Literacy/RST/9-10/9/) Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. |

**Instructional Resources/Materials**

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| * Lewis, R. (2008). *Human genetics: Concepts and applications*. Boston: McGraw-Hill Higher Education. * Lewis, R. (2007). *Case workbook to accompany Human genetics: Concepts and applications*. Boston: McGraw-Hill Higher Education. * Brooker, R. J. (2018). *Genetics: Analysis and Principles*. New York: McGraw Hill Education. * Robinson, T. R. (2010). *Genetics for dummies:* Hoboken, NJ: Wiley. * <Http://Wardisiani.com> * WWW.mhhe.com/lewisgenetics7 |