

Science
Unit 5: Genetics

Essential Understandings	<ul style="list-style-type: none"> ▪ Genes are too small to see with the eye so a variety of models are used to understand them. ▪ Scientists from several disciplines have contributed to an understanding of genetics. ▪ Every kind of living thing reproduces and transfers genetic information to offspring. ▪ Organisms reproduce sexually and/or asexually. ▪ Genetic technology has important implications for moral decisions in our society.
Essential Questions	<ul style="list-style-type: none"> ▪ What are sexual and asexual reproduction? ▪ How is genetic information transferred to offspring? ▪ What is the difference between a dominant and recessive allele? ▪ What are heterozygous and homozygous alleles? ▪ What are the pros and cons of genetic technology? ▪ How has our understanding of genetics changed as various scientists have made discoveries?
Essential Knowledge	<ul style="list-style-type: none"> ▪ Chromosomes are made of DNA, and pieces of DNA that code for traits are called genes. ▪ Some alleles are dominant and some are recessive. ▪ Offspring receive half of their chromosomes from each parent in sexual reproduction. ▪ Offspring receive all of their chromosomes from one parent in asexual reproduction. ▪ Genotype and phenotype are determined by the alleles present. ▪ Punnett squares are used by geneticists to predict the probability of a given trait. ▪ Personal choices can affect others. ▪ Environmental factors can affect traits.
Vocabulary	<ul style="list-style-type: none"> ▪ <u>Terms:</u> <ul style="list-style-type: none"> ○ allele, gene, DNA, chromosome, heterozygous, homozygous, phenotype, genotype, dominant, recessive, genetic, engineering, genetic trait, asexual reproduction, sexual reproduction, Punnett squares, environmental influences on traits
Essential Skills	<ul style="list-style-type: none"> ▪ Use Punnett squares to determine the probability of a given trait. ▪ Identify pros and cons of genetic engineering. ▪ Design an argument using several types of evidence. ▪ Compare and contrast asexual and sexual reproduction. ▪ Explain a way environmental factors can affect traits.

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<p style="text-align: center;">Related Maine Learning Results</p>	<p><u>Science</u></p> <p>A. Unifying Themes</p> <p>A2.Models</p> <p>Students use models to examine a variety of real-world phenomena from the physical setting, the living environment, and the technological world and compare advantages and disadvantages of various models.</p> <ol style="list-style-type: none"> a. Compare different types of models that can be used to represent the same thing (including models of chemical reactions, motion, or cells) in order to match the purpose and complexity of a model to its use. b. Propose changes to models and explain how those changes may better reflect the real thing. <p>C. The Scientific and Technological Enterprise</p> <p>C3.Science, Technology, and Society</p> <p>Students identify and describe the role of science and technology in addressing personal and societal challenges.</p> <ol style="list-style-type: none"> a. Describe how science and technology can help address societal challenges including population, natural hazards, sustainability, personal health and safety, and environmental quality. b. Identify personal choices that can either positively or negatively impact society including population, ecosystem, sustainability, personal health, and environmental quality. <p>C4.History and Nature of Science</p> <p>Students describe historical examples that illustrate how science advances knowledge through the scientists involved and through the ways scientists think about their work and the work of others.</p> <ol style="list-style-type: none"> a. Describe how women and men of various backgrounds, working in teams or alone and communicating about their ideas extensively with others, engage in science, engineering, and related fields. b. Describe a breakthrough from the history of science that contributes to our current understanding of science. c. Describe and provide examples that illustrate that science is a human endeavor that generates explanations based on verifiable evidence that are subject to change when new evidence does not match existing explanations.
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<p style="text-align: center;">Related Maine Learning Results</p>	<p>E. The Living Environment E4.Heridity and Reproduction Students describe the general characteristics and mechanisms of reproduction and heredity in organisms, including humans, and ways in which organisms are affected by their genetic traits.</p> <ul style="list-style-type: none"> a. Explain that sexual reproduction includes fertilization that results in the inclusion of genetic information from each parent and determines the inherited traits that are part of every cell. c. Compare the structures, systems, and interactions that allow single-celled organisms and multi-celled plants and animals, including humans, to defend themselves, acquire and use energy, self-regulate, reproduce, and coordinate movement.
<p style="text-align: center;">Sample Lessons And Activities</p>	<ul style="list-style-type: none"> ▪ Design a timeline of significant contributions to our understanding of genetics. ▪ Research pros and cons of an aspect of genetic engineering. ▪ Create a DNA model.
<p style="text-align: center;">Sample Classroom Assessment Methods</p>	<ul style="list-style-type: none"> ▪ Genetic engineering debate. ▪ DNA Extraction Lab. ▪ Punnett square predictions.
<p style="text-align: center;">Sample Resources</p>	<ul style="list-style-type: none"> ▪ <u>Publications:</u> <ul style="list-style-type: none"> ○ Kids Discover DNA magazines ○ http://learn.genetics.utah.edu/ ○ http://www.amnh.org/ology/?channel=genetics ○ www.pbs.org/wgbh/nova/photo51/ ○ http://www.factmonster.com/spot/frankenfoods1.html ○ www.ornl.gov/sci/techresource/Human_Genome/elsi/gmfood.shtml ○ www.ncbi.nlm.nih.gov/ ○ www.thetech.org/genetics/soomin/index.html ▪ <u>Videos:</u> <ul style="list-style-type: none"> ○ “Eyes of Nye Genetic Engineering” video ○ Designer Babies video