

## Genetics Standards and Benchmarks

<b>Standard 1: Understands and applies principles of scientific inquiry</b>				
<i>Power Benchmarks: Identifies questions and concepts that guide science investigations Uses technology and mathematics to improve investigations and communications Formulates and revises scientific explanations and models using logic and evidence Recognizes and analyzes alternative explanations and models</i>				
<b>Course Level Benchmarks</b>	<b>Vocabulary</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Classroom Resources</b>
A. Formulates and revises scientific explanations and models	<ul style="list-style-type: none"> <li>• scientific explanation</li> <li>• scientific model</li> <li>• data</li> <li>• within tolerance</li> <li>• scientific method</li> </ul>	<ul style="list-style-type: none"> <li>• Knows scientific explanations and models are based on data</li> <li>• Know new data may lead to the modification of scientific explanations and models</li> </ul>	<ul style="list-style-type: none"> <li>• Analyzes data with respect to scientific explanations and models (ACT, SAT, ITED, AP BIO)</li> <li>• Adjusts scientific explanations and models based on data (ACT, SAT, ITED, AP BIO)</li> </ul>	Genetics Curriculum Guide  Emphasized throughout the entire curriculum
B. Understands how scientific knowledge changes with new evidence	<ul style="list-style-type: none"> <li>• scientific knowledge</li> <li>• evidence</li> <li>• influence</li> <li>• genetic engineering</li> <li>• recombinant DNA</li> <li>• ethics</li> </ul>	<ul style="list-style-type: none"> <li>• Knows examples of scientific knowledge that changed when new evidence was presented</li> <li>• Knows that science is an ongoing process and is always open to new ideas</li> </ul>	<ul style="list-style-type: none"> <li>• Describes how science concepts have evolved with the discovery of new evidence</li> <li>• Hypothesizes how current science concepts and practices will influence future societies</li> </ul>	
C. Uses technology and mathematics to perform accurate scientific investigations and communications	<ul style="list-style-type: none"> <li>• technology</li> <li>• mathematics</li> <li>• probability</li> <li>• ratio</li> <li>• accuracy</li> <li>• scientific investigations</li> <li>• scientific communication</li> <li>• spreadsheet and graphs</li> </ul>	<ul style="list-style-type: none"> <li>• Knows how technology can help scientific investigations and communications</li> <li>• Knows mathematical computations and formulas are essential to scientific investigations</li> </ul>	<ul style="list-style-type: none"> <li>• Determines tools most appropriate to use given a particular situation</li> <li>• Uses the necessary mathematics for a particular situation (ACT, SAT, ITED, AP BIO)</li> <li>• Calculates results with a given degree of accuracy</li> <li>• Formulates graphic representation of data (ACT, SAT, ITED, AP BIO)</li> </ul>	<u>Technology:</u> use of science to solve everyday problems

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Recognizes and analyzes alternative explanations and models*

Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
D. Demonstrates safe handling procedures	<ul style="list-style-type: none"> <li>• OSHA</li> <li>• EPA</li> <li>• MSDS</li> <li>• Right to Know</li> <li>• hazardous</li> <li>• safety procedures</li> </ul>	<ul style="list-style-type: none"> <li>• Knows appropriate safety procedures for a given situation</li> <li>• Knows where safety devices are located in the classroom</li> <li>• Understands the process of waste disposal</li> </ul>	<ul style="list-style-type: none"> <li>• Follows required safety procedures.</li> <li>• Recognizes, reports, and corrects safety problems.</li> <li>• Follows waste disposal procedures</li> </ul>	

## Genetics Standards and Benchmarks

### Standard 2: Understands and applies principles of life science

#### *Power Benchmarks: Understands and applies knowledge of the molecular basis of heredity*

Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
A. Explains patterns of inheritance	<ul style="list-style-type: none"> <li>• Mendelian Laws</li> <li>• heritability</li> <li>• genotypes</li> <li>• phenotypes</li> <li>• Punnett Square</li> <li>• monohybrid</li> <li>• dihybrid</li> <li>• purebred</li> <li>• hybrid</li> <li>• test cross</li> <li>• pedigree</li> <li>• dominant</li> <li>• recessive</li> <li>• heterozygous</li> <li>• homozygous</li> <li>• incomplete dominance</li> <li>• co-dominance</li> <li>• epistasis</li> <li>• pleiotrophy</li> <li>• trait</li> <li>• allele</li> <li>• multiple alleles</li> </ul>	<ul style="list-style-type: none"> <li>• Knows the human body is formed from cells that contain two copies of each chromosome and explains many features of human heredity, such as how variations hidden in one generation can be expressed in the next</li> <li>• Knows heritable characteristics can be observed at molecular and whole-organism levels</li> <li>• Knows the characteristics of an organism can be described in terms of a combination of traits</li> <li>• Understands Mendel's laws of heredity and related concepts and how they were developed</li> <li>• Understands there can be exceptions/variations to Mendel's Laws</li> <li>• Understands genetic variation can be predicted and measured statistically</li> </ul>	<ul style="list-style-type: none"> <li>• Uses Mendelian genetics and statistics to solve problems (AP BIO)</li> <li>• Applies the skills of genetic crosses to living organisms</li> <li>• Gathers data/information to explain genetic variations</li> </ul>	<p>Genetics Curriculum Guide</p> <p>Labs: Carolina Biological Supply Company</p>

## Genetics Standards and Benchmarks

<b>Standard 2: Understands and applies principles of life science (con't)</b>				
<i>Power Benchmarks: Understands and applies knowledge of the cell</i> <i>Understands and applies knowledge of the molecular basis of heredity</i>				
<b>Course Level Benchmarks</b>	<b>Vocabulary</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Classroom Resources</b>
B. Describes the form and function of DNA in genes and the process of heredity	<ul style="list-style-type: none"> <li>• cell reproduction</li> <li>• mitosis</li> <li>• meiosis</li> <li>• DNA</li> <li>• karyotype</li> <li>• autosome</li> <li>• chromosome</li> <li>• sex chromosome</li> <li>• linked DNA</li> <li>• RNA</li> <li>• gene</li> <li>• protein</li> <li>• crossing over</li> <li>• Barr bodies</li> <li>• sex-influenced and sex-limited inheritance</li> <li>• locus</li> <li>• transcription</li> <li>• translation</li> <li>• ribosome</li> <li>• intron</li> <li>• exon</li> <li>• Human Genome Project</li> </ul>	<ul style="list-style-type: none"> <li>• Knows cells store and use information to guide their functions</li> <li>• Knows the genetic information stored in DNA is used to direct the synthesis of the thousands of proteins that each cell requires</li> <li>• Knows cell reproduction occurs through a series of stages which results in two copies of each chromosome</li> <li>• Knows sex is determined by particular chromosomes, which are also responsible for the expression of some traits</li> <li>• Knows organisms are regulated both through changes in the activity of the proteins and through selective expression of individual genes</li> <li>• Knows how hereditary information is coded in DNA</li> </ul>	<ul style="list-style-type: none"> <li>• Describes the structure of DNA and the process of replication</li> <li>• Explains the structure and function of chromosomes</li> <li>• Explains how the genetic information that underlies heredity is encoded in genes, replicated, and expressed (AP BIO)</li> <li>• Uses molecular genetics to solve problems</li> </ul>	<p>Genetics Curriculum Guide</p> <p>Videos: <i>Translating the Code: Protein Synthesis</i> and <i>Lorenzo's Oil</i></p> <p>Websites</p>

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Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
C. Demonstrates how changes in DNA can result in mutations	<ul style="list-style-type: none"> <li>• mutation</li> <li>• crossing over</li> <li>• environmental effects</li> <li>• natural selection</li> <li>• substitution</li> <li>• insertion</li> <li>• deletion</li> <li>• translocation</li> <li>• inversion</li> <li>• plasmid</li> <li>• cloning</li> <li>• recombinant DNA</li> <li>• ligase</li> <li>• restriction enzyme</li> <li>• stem cell</li> </ul>	<ul style="list-style-type: none"> <li>• Knows changes in DNA (mutations) occur spontaneously at low rates</li> <li>• Knows gene mutations can be caused by external factors</li> <li>• Knows mutations in an organism's sex cells may increase genetic variation within a species; other changes in an organism cannot be passed on</li> <li>• Understands the role of DNA and new technologies in health issues</li> <li>• Knows the characteristics of an organism can be described in terms of combination traits, some traits are inherited and others result from interactions with the environment</li> </ul>	<ul style="list-style-type: none"> <li>• Describes the types and results of change in organisms that mutations can produce (AP BIO)</li> <li>• Explains how some mutations may confer a selective advantage in a given environment</li> <li>• Explains the techniques and applications of various biotechnological procedures</li> </ul>	<p>Genetics Curriculum Guide</p> <p>Video: <i>Genetic Engineering and Protein Synthesis</i></p> <p>Carolina Biological Supplies</p>