

## Investigative Biology 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>• Knows 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>	Investigative Biology Curriculum Guide  Emphasized throughout the entire curriculum          <u>Technology:</u> use of science to solve everyday problems
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>• 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>• spreadsheets 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>	
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>	

## Investigative Biology Standards and Benchmarks

Standard 2: Understands and applies principles of life science				
<i>Power Benchmarks: Understands and applies knowledge of the cell</i>				
<i>Understands and applies knowledge of matter, energy, and organization in living things</i>				
Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
A. Describes how organisms obtain and use energy	<ul style="list-style-type: none"> <li>• photosynthesis</li> <li>• cellular respiration</li> <li>• transpiration</li> <li>• producers</li> <li>• consumers</li> <li>• decomposers</li> <li>• energy pyramid</li> <li>• chlorophyll</li> <li>• chloroplasts</li> <li>• mitochondria</li> </ul>	<ul style="list-style-type: none"> <li>• Knows how energy is stored in a plant</li> <li>• Understands how chemical reactions occur within a cell</li> <li>• Understands how products of photosynthesis are transported throughout a plant</li> </ul>	<ul style="list-style-type: none"> <li>• Identifies the raw materials and products of cellular respiration and photosynthesis (AP BIO)</li> <li>• Examines the photosynthetic structures of a plants (AP BIO)</li> </ul>	Investigative Biology Curriculum Guide
B. Describes structures, functions, and processes of the cells, tissues, and organs	<ul style="list-style-type: none"> <li>• osmosis</li> <li>• diffusion</li> <li>• cell membrane</li> <li>• cell wall</li> <li>• organelle</li> <li>• nucleus</li> <li>• cytoplasm</li> <li>• vacuole</li> <li>• tissue</li> <li>• organ</li> <li>• system</li> </ul>	<ul style="list-style-type: none"> <li>• Knows plant and animal cells differ in basic structure and function</li> <li>• Understands key organelles and their functions</li> <li>• Knows the different forms of cellular transport</li> </ul>	<ul style="list-style-type: none"> <li>• Identifies cellular structures and cell types under a microscope</li> <li>• Models principles of osmosis and diffusion</li> <li>• Sequences the organization of cells to organisms</li> </ul>	

## Investigative Biology Standards and Benchmarks

### Standard 2: Understands and applies principles of life science (con't)

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

Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
C. Investigates cell reproduction and heredity	<ul style="list-style-type: none"> <li>• genotype</li> <li>• phenotype</li> <li>• homozygous</li> <li>• heterozygous</li> <li>• gene</li> <li>• DNA</li> <li>• chromosome</li> <li>• replication</li> <li>• sex-linked (X-linked, Y-linked)</li> <li>• mutation</li> <li>• nucleus</li> <li>• nuclear membrane</li> <li>• mitosis</li> <li>• meiosis</li> <li>• body cells (somite)</li> <li>• sex cells (gamete)</li> <li>• cancer</li> <li>• aging</li> </ul>	<ul style="list-style-type: none"> <li>• Knows cells store heredity information that is coded in DNA and stored on chromosomes</li> <li>• Knows punnett squares and pedigrees predict patterns of inheritance</li> <li>• Knows how hereditary information is coded in DNA</li> <li>• Understands the steps of cellular reproduction (mitosis and meiosis)</li> <li>• Knows how the cell cycle occurs and how is it regulated</li> </ul>	<ul style="list-style-type: none"> <li>• Uses Mendelian genetics (such as Punnett squares and pedigrees) to solve problems</li> <li>• Models the process of protein synthesis</li> <li>• Models cellular reproduction</li> </ul>	<p>Investigative Biology Curriculum Guide</p> <p>Mississippi Valley Regional Blood Center</p>

## Investigative Biology Standards and Benchmarks

<b>Standard 2: Understands and applies principles of life science (con't)</b>				
<i>Power Benchmarks: Understands and applies knowledge of biological evolution</i> <i>Understands and applies knowledge of the behavior of organisms</i>				
<b>Course Level Benchmarks</b>	<b>Vocabulary</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Classroom Resources</b>
D. Explains how organisms change over time	<ul style="list-style-type: none"> <li>• adaptation</li> <li>• natural selection</li> <li>• variation</li> <li>• evolution</li> <li>• species</li> <li>• Darwin</li> <li>• extinction</li> </ul>	<ul style="list-style-type: none"> <li>• Understands the difference between a variation and an adaptation</li> <li>• Knows mutations in organisms' sex cells may increase genetic variation within a species</li> <li>• Knows there is evidence that supports evolution</li> </ul>	<ul style="list-style-type: none"> <li>• Explains how some mutations may confer a selective advantage in a given environment</li> <li>• Explains and applies the theory of evolution by means of natural selection (AP BIO)</li> </ul>	Investigative Biology Curriculum Guide  PBS Evolution video series