



# Biology

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STANDARDS		PAGE REFERENCES
<b><u>I. Content Standards</u></b>		
<b>1. The Chemistry of Life</b>		
<i>Broad Concept:</i> Chemical elements form organic molecules that interact to perform the basic functions of life.		
1.1	Recognize that biological organisms are composed primarily of very few elements. The six most common are C, H, N, O, P, S.	<b>Student Edition:</b> 148-155, 156-160, 161-165, 166-171 <i>MiniLab</i> 154, 156 <i>National Geographic</i> 162 <b>Teacher Wraparound Edition:</b> CT 168; D 152, 161, 166, 170; DC 164, 168, 170, 171; FA 171; RS 166, 169; SP 166, 167
1.2	Describe the basic molecular structures and primary functions of the four major categories of organic molecules (carbohydrates, lipids, proteins, and nucleic acids).	<b>Student Edition:</b> 166-171 <i>Data Analysis Lab</i> 169 <b>Teacher Wraparound Edition:</b> CB 168; CT 168; D 166, 170; DC 168, 171; SP 167; WS 170, 171

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<p>1.3 Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, which have an effect on enzymes.</p>	<p><b>Student Edition:</b>  156-159, 163-165  <i>Data Analysis Lab</i> 164  <i>Design Your Own BioLab</i> 173  <i>MiniLab</i> 159  <i>National Geographic</i> 162  <b>Teacher Wraparound Edition:</b>  CT 158, 165; DC 157, 159; FA 160; SP 158;  WS 158</p>
<p><b>2. Cell Biology</b></p>	
<p><i>Broad Concept:</i> Cells have specific structures and functions that make them distinctive. Processes in a cell can be classified broadly as growth, maintenance, and reproduction.</p>	
<p>2.1 Relate cell parts/organelles (plasma membrane, nuclear envelope, nucleus, nucleolus, cytoplasm, mitochondrion, endoplasmic reticulum, Golgi apparatus, lysosome, ribosome, vacuole, cell wall, chloroplast, cytoskeleton, centriole, cilium, flagellum, pseudopod) to their functions. Explain the role of cell membranes as a highly selective barrier (diffusion, osmosis, facilitated diffusion, and active transport).</p>	<p><b>Student Edition:</b>  182-186, 187-190, 191-200, 201-207  <i>Biolab</i> 209  <i>Data Analysis Lab</i> 189, 194  <i>MiniLab</i> 203  <i>National Geographic</i> 192  <b>Teacher Wraparound Edition:</b>  A 202; CB 196, 197; CT 194, 196; D 188, 191, 201, 203; DC 191, 197, 198, 199, 201, 206; SP 188; WS 193</p>
<p>2.2 Compare and contrast, at the cellular level, prokaryotes and eukaryotes (general structures and degrees of complexity).</p>	<p><b>Student Edition:</b>  182-186, 405-407, 516-521  <i>MiniLab</i> 519  <i>National Geographic</i> 192  <b>Teacher Wraparound Edition:</b>  CT 185, 517; DC 518; SP 186, 516</p>
<p>2.3 Use cellular evidence (such as cell structure, cell number, and cell reproduction) and modes of nutrition to describe six kingdoms (Archaeobacteria, Eubacteria, Protista, Fungi, Plantae, Animalia).</p>	<p><b>Student Edition:</b>  405, 499-503, 542, 546-548, 553-556, 561-564, 576-578, 606, 632-634  <i>MiniLab</i> 500  <i>National Geographic</i> 497, 548  <b>Teacher Wraparound Edition:</b>  CT 500; D 501; DC 405, 501</p>

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<p>2.4 Identify the reactants, products, and basic purposes of photosynthesis and cellular respiration. Explain the interrelated nature of photosynthesis and cellular respiration in the cells of photosynthetic organisms.</p>	<p><b>Student Edition:</b>            218-221, 222-227, 228-233  <i>Data Analysis Lab</i> 232  <i>Design Your Own BioLab</i> 235  <i>MiniLab</i> 220, 221  <i>National Geographic</i> 225  <b>Teacher Wraparound Edition:</b>            A 228; D 224; DC 222, 231; FA 227, 233</p>
<p>2.5 Explain the important role that ATP serves in metabolism.</p>	<p><b>Student Edition:</b>            221, 228-233, 950  <i>Data Analysis Lab</i> 232, 950  <b>Teacher Wraparound Edition:</b>            A 228; CT 221; D 220; FA 233</p>
<p>2.6 Describe the cell cycle and the process of mitosis. Explain the role of mitosis in the formation of new cells, and its importance in maintaining chromosome number during asexual reproduction.</p>	<p><b>Student Edition:</b>            244-247, 248-252, 253-257  <i>Biolab</i> 259  <i>Data Analysis Lab</i> 251  <i>Launch Lab</i> 269  <i>MiniLab</i> 245  <i>National Geographic</i> 249  <b>Teacher Wraparound Edition:</b>            CT 246, 250; D 244, 245, 246, 249</p>
<p>2.7 Describe how the process of meiosis results in the formation of haploid cells. Explain the importance of this process in sexual reproduction, and how gametes form diploid zygotes in the process of fertilization.</p>	<p><b>Student Edition:</b>            270-276  <i>Data Analysis Lab</i> 274  <i>Launch Lab</i> 269  <i>National Geographic</i> 273  <b>Teacher Wraparound Edition:</b>            CT 272; DC 272, 273, 274, 276; RS 271; SP 271, 275</p>
<p>2.8 Compare and contrast a virus and a cell in terms of genetic material and reproduction.</p>	<p><b>Student Edition:</b>            248-252, 253-257, 525-528  <i>Cutting-Edge Biology</i> 532  <i>National Geographic</i> 529  <b>Teacher Wraparound Edition:</b>            FA 531; WS 530</p>

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<b>3. Genetics</b>	
<i>Broad Concept:</i> Genes allow for the storage and transmission of genetic information. They are a set of instructions encoded in the nucleotide sequence of each organism. Genes code for the specific sequences of amino acids that comprise the proteins that are characteristic of that organism.	
3.1 Describe the basic structure (double helix, sugar/phosphate backbone, linked by complementary nucleotide pairs) of DNA, and describe its function in genetic inheritance.	<b>Student Edition:</b> 170-171, 200, 326-332 <i>Biodiscoveries</i> 350 <i>MiniLab</i> 331 <b>Teacher Wraparound Edition:</b> A 329; CB 327; CT 328; D 170, 330; DC 171, 326, 329, 330, 332; FA 332; SP 329
3.2 Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic code. Explain the basic processes of transcription and translation, and how they result in the expression of genes. Distinguish among the end products of replication, transcription, and translation.	<b>Student Edition:</b> 333-335, 336-341 <i>Data Analysis Lab</i> 340 <i>MiniLab</i> 334 <i>National Geographic</i> 339 <b>Teacher Wraparound Edition:</b> CB 337; CT 333; D 339; DC 335, 337, 338, 339, 340, 341; FA 335, 341; RS 333
3.3 Explain how mutations in the DNA sequence of a gene may or may not result in phenotypic change in an organism. Explain how mutations in gametes may result in phenotypic changes in offspring.	<b>Student Edition:</b> 342-349 <i>Data Analysis Lab</i> 348 <b>Teacher Wraparound Edition:</b> CT 348, 349; DC 343, 347; FA 349
3.4 Distinguish among observed inheritance patterns caused by several types of genetic traits (dominant, recessive, incomplete dominance, codominant, sex-linked, polygenic, and multiple alleles).	<b>Student Edition:</b> 277-285, 296-301, 302-310 <i>Biolab</i> 287 <i>Data Analysis Lab</i> 303 <i>MiniLab</i> 281, 301 <i>National Geographic</i> 286, 312 <b>Teacher Wraparound Edition:</b> CB 277; CT 278, 285, 294, 301; D 279, 283, 309; DC 277, 278, 279, 282, 285, 299, 303, 305; FA 282, 301; RS 283
3.5 Describe how Mendel's laws of segregation and independent assortment can be observed through patterns of inheritance (such as dihybrid crosses).	<b>Student Edition:</b> 277-282 <i>MiniLab</i> 281 <b>Teacher Wraparound Edition:</b> CB 277; D 279, 283; DC 277, 278; FA 282; RS 279, 283; SP 279; WS 278

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3.6 Use a Punnett Square to determine the probabilities for genotype and phenotype combinations in monohybrid crosses.	<b>Student Edition:</b> 280-282, 307 <i>Design Your Own BioLab</i> 287 <i>MiniLab</i> 281
<b>4. Anatomy and Physiology</b>	
<i>Broad Concept:</i> There is a relationship between the organization of cells into tissues, and tissues into organs. The structure and function of organs determine their relationships within body systems of an organism. Homeostasis allows the body to perform its normal functions.	
4.1 Explain generally how the digestive system (mouth, pharynx, esophagus, stomach, small and large intestines, rectum) converts macromolecules from food into smaller molecules that can be used by cells for energy and for repair and growth.	<b>Student Edition:</b> 1020-1024, 1025-1030 <i>Biolab</i> 1039 <i>Data Analysis Lab</i> 1028 <i>Launch Lab</i> 1019 <i>MiniLab</i> 1023 <b>Teacher Wraparound Edition:</b> A 1023; CT 1021, 1028; D 1022; DC 1021, 1022, 1026, 1027, 1029, 1030; RS 1020; SP 1020, 1029; WS 1026, 1027
4.2 Explain how the circulatory system (heart, arteries, veins, capillaries, red blood cells) transports nutrients and oxygen to cells and removes cell wastes. Describe how the kidneys and the liver are closely associated with the circulatory system as they perform the excretory function of removing waste from the blood. Recognize that kidneys remove nitrogenous wastes, and the liver removes many toxic compounds from blood.	<b>Student Edition:</b> 992-999, 1005, 1006, 1008, 1009 <i>Biolab</i> 1011 <i>MiniLab</i> 996 <b>Teacher Wraparound Edition:</b> CT 993, 997, 998, 1005; D 1005; DC 992, 994, 995, 997, 998, 1006; FA 999, 1009; RS 992; SP 993, 995, 997, 1006, 1007; WS 995, 997, 999, 1009
4.3 Explain how the respiratory system (nose, pharynx, larynx, trachea, lungs, alveoli) provides exchange of oxygen and carbon dioxide.	<b>Student Edition:</b> 1000-1004 <i>Biolab</i> 1011 <i>MiniLab</i> 1002 <i>National Geographic</i> 1003 <b>Teacher Wraparound Edition:</b> CB 1000; CT 1001; D 1001, 1002; DC 1001; FA 1004; SP 1000, 1002, 1003; WS 1003, 1004

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<p>4.4 Explain how the nervous system (brain, spinal cord, sensory neurons, motor neurons) mediates communication between different parts of the body and the body's interactions with the environment. Identify the basic unit of the nervous system, the neuron, and explain generally how it works.</p>	<p><b>Student Edition:</b>            962-967, 968-972, 973-976  <i>Data Analysis Lab</i> 970  <i>Launch Lab</i> 961  <i>MiniLab</i> 965, 975  <i>National Geographic</i> 966</p> <p><b>Teacher Wraparound Edition:</b>            CB 968; CT 963, 971, 974; D 962, 963, 964, 969, 970, 975; DC 962, 964, 966, 969, 970, 973, 975; RS 963, 968; SP 967, 971, 974; WS 966, 969, 971, 974, 976</p>
<p>4.5 Explain how the muscular/skeletal system (skeletal, smooth and cardiac muscle, bones, cartilage, ligaments, tendons) works with other systems to support and allow for movement. Recognize that bones produce both red and white blood cells.</p>	<p><b>Student Edition:</b>            941-946, 947-951  <i>Data Analysis Lab</i> 950  <i>MiniLab</i> 945  <i>National Geographic</i> 949</p> <p><b>Teacher Wraparound Edition:</b>            A 945-948; CB 947; CT 943, 944, 950; D 941, 942, 949; RS 941, 947; SP 941, 946, 948; WS 942, 945, 950</p>
<p>4.6 Recognize that the sexual reproductive system allows organisms to produce offspring that receive half of their genetic information from their mother and half from their father and that sexually produced offspring resemble, but are not identical to, either of their parents.</p>	<p><b>Student Edition:</b>            1048-1053, 1054-1061  <i>Launch Lab</i> 1047  <i>MiniLab</i> 1052, 1060</p> <p><b>Teacher Wraparound Edition:</b>            CB 1049, 1052; D 1048; DC 1049, 1051; FA 1053; SP 1051; WS 1050</p>
<p>4.7 Recognize that communication between cells is required for coordination of body functions. The nerves communicate with electrochemical signals, hormones circulate through the blood, and some cells produce signals to communicate only with nearby cells.</p>	<p><b>Student Edition:</b>            962-967, 968-972, 1031-1037  <i>Data Analysis Lab</i> 970  <i>MiniLab</i> 965, 1035  <i>National Geographic</i> 966, 1036</p> <p><b>Teacher Wraparound Edition:</b>            CT 1032; D 962, 1031; DC 964, 1033; FA 972</p>
<p>4.8 Recognize that the body's systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop.</p>	<p><b>Student Edition:</b>            165, 187, 1006, 1031-1037  <i>MiniLab</i> 1035  <i>National Geographic</i> 1036</p> <p><b>Teacher Wraparound Edition:</b>            CB 1033; CT 1032, 1033, 1034; D 1031; DC 1006, 1033, 1037</p>

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<b>5. Evolution and Biodiversity</b>	
<i>Broad Concept:</i> Evolution is the result of genetic changes that occur in constantly changing environments. Over many generations, changes in the genetic make-up of populations may affect biodiversity through speciation and extinction.	
<p>5.1 Explain how evolution is demonstrated by evidence from the fossil record, comparative anatomy, genetics, molecular biology, and examples of natural selection.</p>	<p><b>Student Edition:</b>            418-422, 423-430  <i>Data Analysis Lab</i> 420  <i>MiniLab</i> 429  <i>National Geographic</i> 421</p> <p><b>Teacher Wraparound Edition:</b>            A 421; CB 418; CT 419; D 420, 426, 428, 429;            FA 422; RS 419; SP 423, 426, 427</p>
<p>5.2 Describe species as reproductively distinct groups of organisms. Recognize that species are further classified into a hierarchical taxonomic system (kingdom, phylum, class, order, family, genus, species) based on morphological, behavioral, and molecular similarities. Describe the role that geographic isolation can play in speciation.</p>	<p><b>Student Edition:</b>            9, 133, 431-441, 490-498, 499-503  <i>Biolab</i> 505  <i>National Geographic</i> 132, 497</p> <p><b>Teacher Wraparound Edition:</b>            A 491; CT 500; D 490, 501, 502; DC 133, 501;            FA 503</p>
<p>5.3 Explain how evolution through natural selection can result in changes in biodiversity through the increase or decrease of genetic diversity from a population.</p>	<p><b>Student Edition:</b>            125, 418-422, 423-430, 431-441  <i>Biolab</i> 443  <i>Data Analysis Lab</i> 420, 435  <i>MiniLab</i> 429  <i>National Geographic</i> 421</p> <p><b>Teacher Wraparound Edition:</b>            A 421; CB 432, 436, 439; CT 433, 436, 437, 438,            439; DC 432, 434, 440; SP 433, 437</p>

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<b>6. Ecology</b>		
<i>Broad Concept:</i> Ecology is the interaction among organisms and between organisms and their environment.		
6.1	Explain how birth, death, immigration, and emigration influence population size.	<p><b>Student Edition:</b> 36, 92-99, 100-105 <i>Biolab</i> 107 <i>Cutting-Edge Biology</i> 106 <i>Data Analysis Lab</i> 98 <i>Launch Lab</i> 91 <i>MiniLab</i> 101 <i>National Geographic</i> 37, 93</p> <p><b>Teacher Wraparound Edition:</b> A 97; CB 98, 102; CT 102; DC 94, 95; FA 99</p>
6.2	Analyze changes in population size and biodiversity (speciation and extinction) that result from the following: natural causes, changes in climate, human activity, and the introduction of invasive, non-native species.	<p><b>Student Edition:</b> 92-99, 100-105, 116-121, 122-128 <i>Biolab</i> 107 <i>Data Analysis Lab</i> 98 <i>Design Your Own BioLab</i> 51 <i>Launch Lab</i> 91 <i>MiniLab</i> 101, 120, 127 <i>National Geographic</i> 37, 93</p> <p><b>Teacher Wraparound Edition:</b> A 97; CB 124, 125; CT 105, 118; D 116, 118, 122; DC 117, 119, 125; FA 99, 105; SP 104, 123</p>
6.3	Use a food web to identify and distinguish producers, consumers, and decomposers, and explain the transfer of energy through trophic levels. Describe how relationships among organisms (predation, parasitism, competition, commensalism, and mutualism) add to the complexity of biological communities.	<p><b>Student Edition:</b> 41-44, 125 <i>MiniLab</i> 42</p> <p><b>Teacher Wraparound Edition:</b> CT 41; D 42, 43; DC 43; FA 44</p>
6.4	Explain how water, carbon, and nitrogen cycle between abiotic resources and organic matter in an ecosystem and how oxygen cycles through photosynthesis and respiration.	<p><b>Student Edition:</b> 45-49 <i>MiniLab</i> 48</p> <p><b>Teacher Wraparound Edition:</b> CT 47; D 45, 48; DC 46; SP 47</p>

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<b>II. Scientific Inquiry Skills Standards</b>	
<p>Scientific literacy can be achieved by supporting students to inquire about the biological world. Engaging students in scientific inquiry allows them to develop conceptual understandings and scientific skills that are necessary to be informed decision-makers. The science curriculum should include substantial hands-on laboratory and field experiences, as appropriate, for students to develop and use these skills in a Biology course.</p>	
<p><b>SIS1. Make observations, raise questions, and formulate hypotheses.</b></p> <p><i>Students will be able to:</i></p> <ul style="list-style-type: none"> <li>Observe the world around them from a scientific perspective.</li> <li>Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.</li> <li>Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories.</li> </ul>	<p><b>Student Edition:</b></p> <p>16-21</p> <p><i>Biolab</i> 107, 137, 351, 753</p> <p><i>Data Analysis Lab</i> 63, 98, 131, 169, 459, 714, 837</p> <p><i>Design Your Own BioLab</i> 23, 51, 83, 173, 871</p> <p><i>Launch Lab</i> 31</p> <p><i>MiniLab</i> 77, 101, 120, 154, 159, 823</p> <p><i>National Geographic</i> 17</p> <p><b>Teacher Wraparound Edition:</b></p> <p>CB 17, 20; CT 18; D 16</p>
<p><b>SIS2. Design and conduct scientific investigations.</b></p> <p><i>Students will be able to:</i></p> <ul style="list-style-type: none"> <li>Articulate and explain the major concepts being investigated and the purpose of an investigation.</li> <li>Select required materials, equipment, and conditions for conducting an experiment.</li> <li>Identify independent and dependent variables.</li> <li>Write procedures that are clear and replicable.</li> <li>Employ appropriate methods for accurately and consistently <ul style="list-style-type: none"> <li>○ making observations;</li> <li>○ making and recording measurements at an appropriate level of precision; and</li> <li>○ collecting data or evidence in an organized way.</li> </ul> </li> <li>Properly use instruments, equipment, and materials (such as scales, probeware, meter sticks, microscopes, computers, etc.) including: set-up, calibration (if required), technique, maintenance, and storage.</li> <li>Follow safety guidelines.</li> </ul>	<p><b>Student Edition:</b></p> <p>18-21</p> <p><i>Biolab</i> 107, 209, 259, 983</p> <p><i>Design Your Own BioLab</i> 23, 51, 83, 173, 235, 287, 533, 567, 593, 653, 681, 871, 925, 1039</p> <p><i>MiniLab</i> 19</p>

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<p><b>SIS3. Analyze and interpret results of scientific investigations.</b></p> <p><i>Students will be able to:</i></p> <ul style="list-style-type: none"> <li>Present relationships between variables in appropriate forms.</li> <li>○ Represent data and relationships between variables in charts and graphs.</li> <li>○ Use appropriate technology (such as graphing software, etc.) and other tools.</li> </ul> <p>Use mathematical operations to analyze and interpret data results.</p> <p>Identify reasons for inconsistent results, such as sources of error or uncontrolled conditions, and assess the reliability of data.</p> <p>Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis.</p> <p>State questions raised by an experiment that may require further investigation.</p>	<p><b>Student Edition:</b></p> <p><i>Biolab</i> 23, 107, 137, 209, 259, 317, 351</p> <p><i>Data Analysis Lab</i> 14, 39, 63, 98, 131, 164, 169, 189, 194, 232, 251, 274, 303, 340, 348, 376, 406, 420, 435, 528, 590, 732, 777, 837</p> <p><i>Design Your Own BioLab</i> 51, 83, 173, 235, 287</p> <p><i>MiniLab</i> 245, 996</p>
<p><b>SIS4. Communicate and apply the results of scientific investigations.</b></p> <p><i>Students will be able to:</i></p> <ul style="list-style-type: none"> <li>Develop descriptions and explanations of scientific concepts that an investigation focused on.</li> <li>Review information, explain statistical analysis, and summarize data collected and analyzed from an investigation.</li> <li>Explain diagrams and charts that represent relationships of variables.</li> <li>Construct a reasoned argument and respond appropriately to critical comments and questions.</li> <li>Use language and vocabulary appropriately, speak clearly and logically, and use appropriate technology (such as presentation software, etc.) and other tools to present findings.</li> <li>Use and refine scientific models that simulate physical processes or phenomena.</li> </ul>	<p><b>Student Edition:</b></p> <p><i>Biolab</i> 23, 107, 137, 209, 259, 317, 351</p> <p><i>Data Analysis Lab</i> 14, 39, 63, 98, 131, 164, 169, 189, 194, 232, 251, 274, 303, 340, 348, 376, 406, 420, 435, 528, 590, 732, 777, 837</p> <p><i>Design Your Own BioLab</i> 51, 83, 173, 235, 287</p>