

*Biology: The Dynamics of Life*

<b>STANDARD I:</b> The student will understand concepts dealing with the nature of science.	
<b>OBJECTIVE</b>	
1. Analyze the methods of science used to identify and solve problems.	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>• Use process skills to interpret data from graphs, tables, and charts.</li> </ul>	6, 14, 20, 22, 24, 36, 37, 50, 59, 68, 72, 85, 92, 95, 101, 102, 105, 112, 115, 127, 145, 154, 165, 189, 204, 212, 235, 239, 262, 268, 283, 291, 293, 299, 300, 310, 311, 318, 326, 331, 343, 350, 353, 376, 387, 397, 407, 415, 429, 426, 437, 446, 453, 456, 460–461, 476, 480, 497, 511, 523, 544, 563, 567, 570–571, 578, 584, 589, 599, 619, 620, 627, 634, 640, 675, 687, 704, 707, 713, 726, 729, 735, 743, 746, 754, 757, 773, 777, 806, 810–811, 830, 831, 835, 844, 853, 860, 867, 870, 872, 875, 896, 903, 903, 911, 927, 932, 934, 937, 959, 973, 981, 983, 987, 965, 989, 1003, 1010, 1011, 1017, 1035, 1040, 1043, 1099–1101
<ul style="list-style-type: none"> <li>• Identify and distinguish between controls and variables in a scientific investigation.</li> </ul>	14, 22, 29, 31, 58–59, 165, 331, 497, 523, 735, 757, 965, 1028
<ul style="list-style-type: none"> <li>• Identify safe laboratory procedures when handling chemicals, using Bunsen burners, and using laboratory glassware.</li> </ul>	14–15, 28, 54, 58, 84, 151, 164, 182, 188, 198, 209, 214, 254, 371, 490, 511,

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	522, 530, 544, 586, 589, 608, 626, 658, 675, 683, 702, 712, 714, 756, 764, 795, 934, 936, 964, 987, 1006, 1107–1109
<ul style="list-style-type: none"> <li>Identify and use appropriate Systeme International (SI) units for measuring dimensions, volume, and mass.</li> </ul>	20–21, 24–25, 154, 155, 173, 198, 203, 376, 433, 407, 476, 544–545, 522–523, 626–627, 712, 735, 757, 834–835, 907, 910–911, 988–989, 1010, 1097–1098
<ul style="list-style-type: none"> <li>Define and identify examples of hypotheses.</li> </ul>	12, 17, 30–31, 1104–1105
<ul style="list-style-type: none"> <li>Order the proper sequence of steps within the scientific process.</li> </ul>	11–18, 30, 1104–1105
<ul style="list-style-type: none"> <li>Select appropriate laboratory glassware, balances, time measuring equipment, and optical instruments to conduct an investigation.</li> </ul>	58, 164, 236, 274, 522, 683, 910–911, 981, 988–989
<b>STANDARD II:</b> The student will understand concepts dealing with matter.	
<b>OBJECTIVE</b>	
1. Trace the transfer of matter and energy through biological systems.	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>Identify, define, and distinguish among producers (autotrophs), consumers, and decomposers (heterotrophs).</li> </ul>	46–47
<ul style="list-style-type: none"> <li>Trace the flow of energy through food chains, food webs, and energy pyramids.</li> </ul>	48–57
<ul style="list-style-type: none"> <li>Identify the reactants and products associated with photosynthesis and cellular respiration and the purpose of these two processes.</li> </ul>	225–230, 231–237, 242–243
<ul style="list-style-type: none"> <li>Describe the carbon, nitrogen, and water cycles— including transpiration and respiration.</li> </ul>	53–57, 62–63
<b>STANDARD II:</b> The student will understand concepts dealing with matter.	
<b>OBJECTIVE</b>	
2. Relate particle motion to the states of matter (solids, liquids, and gases).	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>Identify states of matter in terms of molecular (particle) movement, density, and kinetic energy associated with each</li> </ul>	

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phase/state of a given type of matter.	
<b>STANDARD II:</b> The student will understand concepts dealing with matter.	
<b>OBJECTIVE</b>	
3. Apply information from the periodic table and make predictions using the organization of the periodic table.	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>Determine the number of protons, neutrons, electrons, and mass of an element using the periodic table.</li> </ul>	
<ul style="list-style-type: none"> <li>Use the periodic table to identify and locate metals, nonmetals, metalloids, and noble gases.</li> </ul>	
<ul style="list-style-type: none"> <li>Use data about the number of electrons in the outer electron shell of an atom, including simple dot diagrams, to determine its stability/reactivity and be able to predict ionic charge resulting from reactions.</li> </ul>	142–148, 168
<b>STANDARD II:</b> The student will understand concepts dealing with matter.	
<b>OBJECTIVE</b>	
4. Identify how factors affect rates of physical and chemical changes.	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>Demonstrate knowledge that some factors and substances can affect the rate at which physical and chemical changes occur in living and nonliving systems— such as the digestive process.</li> </ul>	161–163, 917–923, 936–937, 940
Note: Factors and substances include such things as temperature, concentration, surface area, and catalysts— including enzymes.	
<b>STANDARD III:</b> The student will understand concepts of the diversity of life.	
<b>OBJECTIVE</b>	
1. Distinguish among the taxonomic groups by major characteristics.	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>Recognize the correct sequence or taxonomic classification of organisms from the most inclusive level to the least inclusive level— may include use of a chart to compare two species and to identify the classification level at which one species no longer shares common characteristics with other species.</li> </ul>	445–449, 450–452, 461–462, 464–465
<ul style="list-style-type: none"> <li>Classify organisms into the five kingdoms based on recognizing two or more characteristics associated with organisms in a given kingdom.</li> </ul>	456–459, 464–465
<ul style="list-style-type: none"> <li>Recognize properly written scientific names using binomial nomenclature.</li> </ul>	444–445

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<b>STANDARD III:</b> The student will understand concepts of the diversity of life.	
<b>OBJECTIVE</b>	
2. Differentiate structures, functions, and characteristics of plants.	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>Identify various plants as being vascular or nonvascular and describe the basic mechanisms by which vascular and nonvascular plants sustain themselves.</li> </ul>	562–563, 564–569, 574–575, 577–580, 581–587, 588–597, 602–603
<ul style="list-style-type: none"> <li>Identify the distinguishing characteristics of angiosperms and gymnosperms in terms of their structures and reproduction.</li> </ul>	590–597, 602–603
<ul style="list-style-type: none"> <li>Identify reproductive structures and their functions in angiosperms.</li> </ul>	641–645, 646–657, 658–659, 662
<ul style="list-style-type: none"> <li>Demonstrate knowledge of which characteristics/traits would be best suited for plants growing in different environments and/or exposed to different pests.</li> </ul>	564–569, 574–575
<b>STANDARD III:</b> The student will understand concepts of the diversity of life.	
<b>OBJECTIVE</b>	
3. Differentiate structures, functions, and characteristics of animals.	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>Distinguish characteristics of vertebrates and invertebrates in terms of a broad but basic range of physical and reproductive traits.</li> </ul>	672–679, 680–685, 686–687, 690–691, 782–787, 788–789, 880–887, 888–889
<ul style="list-style-type: none"> <li>Explain how animals are adapted to their environment— such as protective coloration, mimicry, claws, beaks, etc.</li> </ul>	44–45, 63, 132–135, 396–399, 418–419, 859–867
<b>STANDARD IV:</b> The student will understand concepts of heredity.	
<b>OBJECTIVE</b>	
1. Recognize heritable characteristics of organisms.	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>Identify physical traits that are passed from parents to offspring.</li> </ul>	255–262, 311, 313, 315–322, 328
<ul style="list-style-type: none"> <li>Recognize how genetic traits including diseases and disorders are passed from one generation to the next— may include family pedigrees and monohybrid Punnett squares.</li> </ul>	309–314, 315–322, 323–329, 330–331, 334–335
<ul style="list-style-type: none"> <li>Identify what happens to the DNA code when a mutation occurs and identify the major causes of mutations.</li> </ul>	296–301, 306
<ul style="list-style-type: none"> <li>Recognize and evaluate the harms and benefits that result when mutations occur.</li> </ul>	212–213, 296–297, 299, 306–307, 406–

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<b>STANDARD IV:</b> The student will understand concepts of heredity.	
<b>OBJECTIVE</b>	
2. Explain how the DNA molecule transfers genetic information from parent to offspring.	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>• Describe the relationships among DNA, genes, and chromosomes.</li> </ul>	163, 203–205, 211, 288
<ul style="list-style-type: none"> <li>• Describe in basic terms the structure and function of DNA.</li> </ul>	281–287, 288, 306–307
<ul style="list-style-type: none"> <li>• Define the genetic purpose for meiosis from generation to generation.</li> </ul>	263–273, 278–279
<ul style="list-style-type: none"> <li>• Define and distinguish between dominant and recessive genes and how each is expressed in parents and offspring.</li> </ul>	256–257, 278–279, 311–314, 334–335
<b>STANDARD V:</b> The student will understand concepts of cells.	
<b>OBJECTIVE</b>	
1. Distinguish relationships among cell structures, functions, and organization in living organisms.	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>• Define and identify representations of diffusion and osmotic systems and what substances are transported by these processes—may include graphic representations.</li> </ul>	154–156, 168, 195–199, 201, 247
<ul style="list-style-type: none"> <li>• Recognize differences between active and passive transport of substances and the energy requirements associated with these transport systems.</li> </ul>	198–200, 944–945
<ul style="list-style-type: none"> <li>• Identify and define similarities and differences between plant and animal cells.</li> </ul>	183, 186–187, 188–189, 192, 246, 605
<ul style="list-style-type: none"> <li>• Classify organisms as prokaryotic or eukaryotic; identify and define similarities and differences between prokaryotic and eukaryotic cells.</li> </ul>	173–174, 180–187, 192, 245, 456–457, 484
<ul style="list-style-type: none"> <li>• Describe cell locomotion by means of cilia and flagella and recognize some organisms that depend on one or the other of these means of locomotion.</li> </ul>	185–187, 246, 506–508, 526–527, 708
<ul style="list-style-type: none"> <li>• Identify cell organelles and define functions of cell organelles—may include graphic representations.</li> </ul>	173, 181–187, 188–189, 192–193, 246, 248
<ul style="list-style-type: none"> <li>• Distinguish and identify examples of cellular organization at the cell, tissue, organ, system, and organism level.</li> </ul>	6–7, 30, 210, 1048, 1056
<b>STANDARD V:</b> The student will understand concepts of cells.	
<b>OBJECTIVE</b>	
2. Differentiate between mitosis and meiosis.	

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<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>• Define, contrast, and compare mitosis and meiosis— may include events needed to prepare the cell for these processes.</li> </ul>	204, 206–209, 214–215, 218, 265–270, 278–279, 361
<ul style="list-style-type: none"> <li>• Describe the purpose of mitotic and meiotic divisions during different life stages of organisms— such as asexual and sexual reproduction and growth and repair.</li> </ul>	210, 214–215, 265–266, 269–270
<b>STANDARD VI: The student will understand concepts of interdependence.</b>	
<b>OBJECTIVE</b>	
1. Demonstrate an understanding of factors that affect the dynamic equilibrium of populations and ecosystems.	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>• Describe the harmful/beneficial consequences of introducing a non-native species into an ecosystem.</li> </ul>	120
<ul style="list-style-type: none"> <li>• Identify species that are competing for resources and predict outcomes of that competition.</li> </ul>	98–99, 108–109
<ul style="list-style-type: none"> <li>• Identify and define biotic and abiotic components of different environments.</li> </ul>	37–38, 41, 62–63, 70–83, 132–133, 136–137
<ul style="list-style-type: none"> <li>• Determine how viruses, bacteria, and parasites affect the dynamic equilibrium of populations.</li> </ul>	44–45, 93, 97, 716
<ul style="list-style-type: none"> <li>• Identify human activities that affect the dynamic equilibrium of populations and ecosystems.</li> </ul>	54–55, 115–120, 121–125, 128, 130–131, 716
<ul style="list-style-type: none"> <li>• Identify factors and relationships— such as predator/prey— that affect population dynamics and ecosystems.</li> </ul>	44–45, 58–59, 62, 96–99, 132–133
<ul style="list-style-type: none"> <li>• Explain why diversity within a species is important and how heritable traits ensure survival.</li> </ul>	407–409, 412–413, 418–419
<b>STANDARD VII: The student will understand concepts of energy.</b>	
<b>OBJECTIVE</b>	
1. Relate the Law of Conservation of Energy to energy transformations.	
<b>ELIGIBLE CONTENT</b>	
<ul style="list-style-type: none"> <li>• Describe how energy— mechanical, electrical, chemical, light, sound, and heat— can be transformed from one form to another.</li> </ul>	48, 52, 62–63, 133, 185
<ul style="list-style-type: none"> <li>• Show understanding that energy transformations result in no net gain or loss of energy, but that in energy conversions less energy is available due to heat loss during the transformations.</li> </ul>	52, 62
<ul style="list-style-type: none"> <li>• Apply the concept of conservation and transformation of energy within and between organisms and the environment— such as food chains, food webs, and energy pyramids.</li> </ul>	46–52, 62–63, 133, 184–185, 192, 225–230, 231–237, 238–

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	239, 242–243, 246–247
<b>STANDARD VII:</b> The student will understand concepts of energy.	
<b>OBJECTIVE</b>	
2. Relate waves to the transfer of energy.	
<b>ELIGIBLE CONTENT</b>	
• Relate wavelength to energy.	119, 296
• Describe how waves travel through different kinds of media.	904, 952
• Describe how waves— earthquake waves, sound waves, water waves, and electromagnetic waves— can be destructive/beneficial due to the transfer of energy.	119, 226–227, 296, 954
<b>STANDARD VIII:</b> The student will understand concepts of force and motion.	
<b>OBJECTIVE</b>	
1. Relate Newton’s three laws of motion to real-world applications.	564, 655, 727, 828
<b>ELIGIBLE CONTENT</b>	
None specified.	
<b>STANDARD VIII:</b> The student will understand concepts of force and motion.	
<b>OBJECTIVE</b>	
2. Relate force to pressure in fluids.	
<b>ELIGIBLE CONTENT</b>	
• Relate force to pressure in fluids. (Note: Formulas will be provided, where needed, to calculate fluid force in closed systems.)	655
• Apply the concept of fluid pressure to biological systems— such as in strokes, aneurysms, the bends, blood pressure, lung function, equalization of pressure on the eardrum, and turgor pressure.	155–156, 196–198, 218–219, 655, 984, 992, 933