



Biology

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| STANDARDS | PAGE REFERENCES |
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| <p>STANDARD I: Students will understand that living organisms interact with one another and their environment.</p> | |
| <p>Objective 1: Summarize how energy flows through an ecosystem.</p> | |
| <p>a. Arrange components of a food chain according to energy flow.</p> | <p>Student Edition: 42-43 <i>Assessment 44 (#2)</i> <i>Chapter Assessment 54 (#23, #25)</i> Teacher Wraparound Edition: DE 43; FA 44</p> |
| <p>b. Compare the quantity of energy in the steps of an energy pyramid.</p> | <p>Student Edition: 44 <i>Assessment 44 (#6)</i></p> |
| <p>c. Describe strategies used by organisms to balance the energy expended to obtain food to the energy gained from the food (e.g., migration to areas of seasonal abundance, switching type of prey based upon availability, hibernation or dormancy).</p> | <p>Student Edition: 917-919 <i>Assessment 923 (#1)</i> <i>Data Analysis Lab 918</i> Teacher Wraparound Edition: CB 916; DC 918</p> |

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| <p>d. Compare the relative energy output expended by an organism in obtaining food to the energy gained from the food (e.g., hummingbird - energy expended hovering at a flower compared to the amount of energy gained from the nectar, coyote - chasing mice to the energy gained from catching one, energy expended in migration of birds to a location with seasonal abundance compared to energy gained by staying in a cold climate with limited food).</p> | <p>This standard can be addressed in a discussion of the following: Student Edition: 38-39, 41, 671, 917-919 <i>Data Analysis Lab</i> 918 Teacher Wraparound Edition: DC 918; SP 919, 923</p> |
| <p>e. Research food production in various parts of the world (e.g., industrialized societies' greater use of fossil fuel in food production, human health related to food product).</p> | <p>Student Edition: 6, 118-119, 371, 663 <i>Biology & Society</i> 680 <i>National Geographic: In the Field</i> 286 Teacher Wraparound Edition: AG 680; CT 118; DC 118, 370</p> |
| <p>Objective 2: Explain relationships between matter cycles and organisms.</p> | |
| <p>a. Use diagrams to trace the movement of matter through a cycle (i.e., carbon, oxygen, nitrogen, water) in a variety of biological communities and ecosystems.</p> | <p>Student Edition: 45-49 Teacher Wraparound Edition: DC 45; FA 49; RS 49</p> |
| <p>b. Explain how water is a limiting factor in various ecosystems.</p> | <p>Student Edition: 35, 46, 61, 70 Teacher Wraparound Edition: DC 70</p> |
| <p>c. Distinguish between inference and evidence in a newspaper, magazine, journal, or Internet article that addresses an issue related to human impact on cycles of matter in an ecosystem and determine the bias in the article.</p> | <p>The teacher can address this standard using the following page references. Student Edition: 15, 16 <i>Skillbuilder Handbook</i> 1111 Teacher Wraparound Edition: CT 18; DC 15, 67</p> |
| <p>d. Evaluate the impact of personal choices in relation to the cycling of matter within an ecosystem (e.g., impact of automobiles on the carbon cycle, impact on landfills of processed and packaged foods).</p> | <p>The teacher can address this standard using the following page references. Student Edition: 47, 126-127, 130 Teacher Wraparound Edition: DE 48</p> |

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| Objective 3: Describe how interactions among organisms and their environment help shape ecosystems. | |
| a. Categorize relationships among living things according to predator-prey, competition, and symbiosis. | Student Edition: 38-40, 95-96 <i>BioLab</i> 107 <i>Chapter Assessment</i> 53 (#12) |
| b. Formulate and test a hypothesis specific to the effect of changing one variable upon another in a small ecosystem. | Student Edition: <i>BioLab</i> 83, 107 Teacher Wraparound Edition: DE 61 |
| c. Use data to interpret interactions among biotic and abiotic factors (e.g., pH, temperature, precipitation, populations, diversity) within an ecosystem. | Student Edition: 35 <i>Assessment</i> 64 (#6) <i>BioLab</i> 51, 83, 107 <i>Data Analysis Lab</i> 39, 63, 98, 131 <i>Launch Lab</i> 31 <i>MiniLab</i> 101 Teacher Wraparound Edition: DE 60, 61, 69 |
| d. Investigate an ecosystem using methods of science to gather quantitative and qualitative data that describe the ecosystem in detail. | Student Edition: <i>BioLab</i> 51, 83, 107, 137 <i>Launch Lab</i> 115 <i>MiniLab</i> 48, 127 Teacher Wraparound Edition: DC 117; DE 69 |
| e. Research and evaluate local and global practices that affect ecosystems. | Student Edition: 66, 123-128, 129-131, 133-135 <i>Assessment</i> 128 (#6) <i>Biology & Society</i> 870, 1010 <i>MiniLab</i> 120 <i>National Geographic: In the Field</i> 172 Teacher Wraparound Edition: DE 69 |

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| STANDARD II: Students will understand that all organisms are composed of one or more cells that are made of molecules, come from preexisting cells, and perform life functions. | |
| Objective 1: Describe the fundamental chemistry of living cells. | |
| a. List the major chemical elements in cells (i.e., carbon, hydrogen, nitrogen, oxygen, phosphorus, sulfur, trace elements). | Student Edition: 149, 166 Teacher Wraparound Edition: DE 166; SP 167 |
| b. Identify the function of the four major macromolecules (i.e., carbohydrates, proteins, lipids, nucleic acids). | Student Edition: 167-171 <i>Assessment 171 (#2)</i> <i>Chapter Assessment 177 (#47)</i> |
| c. Explain how the properties of water (e.g., cohesion, adhesion, heat capacity, solvent properties) contribute to maintenance of cells and living organisms. | Student Edition: 161, 163-165 <i>Assessment 165 (#1, #2)</i> <i>National Geographic 162</i> Teacher Wraparound Edition: DC 162; DE 161; FA 165 |
| d. Explain the role of enzymes in cell chemistry. | Student Edition: 159-160 <i>Assessment 160 (#4)</i> <i>BioLab 173</i> <i>MiniLab 159</i> Teacher Wraparound Edition: DC 159; FA 160 |
| Objective 2: Describe the flow of energy and matter in cellular function. | |
| a. Distinguish between autotrophic and heterotrophic cells. | Student Edition: 41, 42, 197, 219 <i>Assessment 44 (#1), 221 (#3)</i> Teacher Wraparound Edition: DC 197; MI 41; WS 219 |
| b. Illustrate the cycling of matter and the flow of energy through photosynthesis (e.g., by using light energy to combine CO ₂ and H ₂ O to produce oxygen and sugars) and respiration (e.g., by releasing energy from sugar and O ₂ to produce CO ₂ and H ₂ O). | Student Edition: 41, 42-43, 45, 47, 219, 220, 233 <i>Assessment 221 (#6)</i> <i>MiniLab 220</i> Teacher Wraparound Edition: DC 43, 45; MI 41 |

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| c. Measure the production of one or more of the products of either photosynthesis or respiration. | Student Edition: <i>BioLab</i> 235 <i>MiniLab</i> 220, 558 Teacher Wraparound Edition: DE 224, 231 |
| Objective 3: Investigate the structure and function of cells and cell parts. | |
| a. Explain how cells divide from existing cells. | Student Edition: 183, 246-247, 248, 250-252 <i>Assessment</i> 252 (#2) <i>National Geographic</i> 248 Teacher Wraparound Edition: DC 249; DE 249 |
| b. Describe cell theory and relate the nature of science to the development of cell theory (e.g., built upon previous knowledge, use of increasingly more sophisticated technology). | Student Edition: 182-185 <i>Assessment</i> 186 (#1, #3) Teacher Wraparound Edition: CB 184; SP 182 |
| c. Describe how the transport of materials in and out of cells enables cells to maintain homeostasis (i.e., osmosis, diffusion, active transport). | Student Edition: 187, 201-207 <i>Assessment</i> 207 (#1-#4) <i>BioLab</i> 209 <i>MiniLab</i> 203 Teacher Wraparound Edition: DC 187, 201, 206; DE 203; MI 187; WS 204, 205 |
| d. Describe the relationship between the organelles in a cell and the functions of that cell. | Student Edition: 193-200 <i>National Geographic</i> 192 Teacher Wraparound Edition: CT 194; DC 199; RS 195; WS 193 |
| e. Experiment with microorganisms and/or plants to investigate growth and reproduction. | Student Edition: <i>BioLab</i> 259, 593, 653 <i>MiniLab</i> 580, 583 Teacher Wraparound Edition: DE 520, 662 |

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| <p>STANDARD III: Students will understand the relationship between structure and function of organs and organ systems.</p> | |
| <p>Objective 1: Describe the structure and function of organs.</p> | |
| <p>a. Diagram and label the structure of the primary components of representative organs in plants and animals (e.g., heart - muscle tissue, valves and chambers; lung - trachea, bronchial, alveoli; leaf - veins, stomata; stem - xylem, phloem, cambium; root - tip, elongation, hairs; skin - layers, sweat glands, oil glands, hair follicles; ovaries - ova, follicles, corpus luteum).</p> | <p>Student Edition: 637-638, 639-647, 936-937, 994, 1001, 1006-1007, 1048-1050 <i>Assessment</i> 647 (#4), 1009 (#3) <i>BioLab</i> 681 Teacher Wraparound Edition: DC 637; FA 999, 1004; SP 640, 995</p> |
| <p>b. Describe the function of various organs (e.g., heart, lungs, skin, leaf, stem, root, ovary).</p> | <p>Student Edition: 639-647, 668-669, 938-939, 969, 994-995, 1000-1001, 1006-1007, 1048-1050 Teacher Wraparound Edition: FA 647; SP 668</p> |
| <p>c. Relate the structure of organs to the function of organs.</p> | <p>Student Edition: 639-647, 668-669, 938-939, 969, 994-995, 1000-1001, 1006-1007, 1048-1050 Teacher Wraparound Edition: FA 647; SP 668</p> |
| <p>d. Compare the structure and function of organs in one organism to the structure and function of organs in another organism.</p> | <p>Student Edition: 792-796, 821-827, 835-838, 853-856, 861-866, 880-888 <i>Assessment</i> 888 (#5) <i>BioLab</i> 681 <i>Launch Lab</i> 819 <i>MiniLab</i> 666, 672, 765, 938</p> |
| <p>e. Research and report on technological developments related to organs.</p> | <p>Student Edition: 256-257, 1009 <i>Cutting-Edge Biology</i> 952 Teacher Wraparound Edition: CB 995; RS 256; WS 257, 1009</p> |
| <p>Objective 2: Describe the relationship between structure and function of organ systems in plants and animals.</p> | |
| <p>a. Relate the function of an organ to the function of an organ system.</p> | <p>Student Edition: 639-647, 668-669, 936-939, 992-996, 1000-1002, 1005-1007, 1020-1024, 1048-1050 Teacher Wraparound Edition: CT 644; DC 992; DE 1005; MI 639; WS 939</p> |

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| <p>b. Describe the structure and function of various organ systems (i.e., digestion, respiration, circulation, protection and support, nervous) and how these systems contribute to homeostasis of the organism.</p> | <p>Student Edition: 644-645, 936-939, 968-972, 992-996, 1000-1002, 1005-1007, 1020-1024, 1031-1035 <i>Assessment</i> 972 (#6), 1037 (#3) <i>MiniLab</i> 1035 <i>National Geographic</i> 1003 Teacher Wraparound Edition: CT 645; DC 992; MI 1005</p> |
| <p>c. Examine the relationships of organ systems within an organism (e.g., respiration to circulation, leaves to roots) and describe the relationship of structure to function in the relationship.</p> | <p>Student Edition: 645, 971-972, 994-996, 1001, 1023, 1037 <i>Assessment</i> 972 (#6), 1037 (#3) <i>National Geographic</i> 1003, 1036 Teacher Wraparound Edition: CB 646</p> |
| <p>d. Relate the tissues that make up organs to the structure and function of the organ.</p> | <p>Student Edition: 639-647, 668-669, 938-939, 969, 994-995, 1000-1001, 1006-1007, 1048-1050 Teacher Wraparound Edition: FA 647; SP 668</p> |
| <p>e. Compare the structure and function of organ systems in one organism to the structure and function in another organism (e.g., chicken to sheep digestive system; fern to peach reproductive system).</p> | <p>Student Edition: 792-796, 821-827, 835-838, 853-856, 861-866, 880-888 <i>Assessment</i> 616 (#2), 888 (#5) <i>BioLab</i> 681 <i>Launch Lab</i> 603, 819 <i>MiniLab</i> 605, 666, 672, 765, 938 <i>National Geographic</i> 883</p> |
| <p>STANDARD IV: Students will understand that genetic information coded in DNA is passed from parents to offspring by sexual and asexual reproduction. The basic structure of DNA is the same in all living things. Changes in DNA may alter genetic expression.</p> | |
| <p>Objective 1: Compare sexual and asexual reproduction.</p> | |
| <p>a. Explain the significance of meiosis and fertilization in genetic variation.</p> | <p>Student Edition: 270-271, 275-276, 283 <i>Assessment</i> 276 (#5), 285 (#6) Teacher Wraparound Edition: RS 283</p> |

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| <p>b. Compare the advantages/disadvantages of sexual and asexual reproduction to survival of species.</p> | <p>Student Edition: 276, 283 <i>Assessment 285 (#6)</i> Teacher Wraparound Edition: DC 276; RS 283</p> |
| <p>c. Formulate, defend, and support a perspective of a bioethical issue related to intentional or unintentional chromosomal mutations.</p> | <p>Student Edition: 313-315 <i>Assessment 315 (#6, #7)</i> <i>National Geographic: In the Field 286</i> Teacher Wraparound Edition: CT 313; WS 313</p> |
| <p>Objective 2: Predict and interpret patterns of inheritance in sexually reproducing organisms.</p> | |
| <p>a. Explain Mendel's laws of segregation and independent assortment and their role in genetic inheritance.</p> | <p>Student Edition: 277-280 <i>Assessment 282 (#2)</i> Teacher Wraparound Edition: DC 279; WS 278, 280</p> |
| <p>b. Demonstrate possible results of recombination in sexually reproducing organisms using one or two pairs of contrasting traits in the following crosses: dominance/recessive, incomplete dominance, codominance, and sex-linked traits.</p> | <p>Student Edition: 278-282, 302-304, 307-309 <i>Assessment 282 (#3)</i> <i>BioLab 287</i> <i>MiniLab 281</i> Teacher Wraparound Edition: CT 307; DC 303, 305; SP 304</p> |
| <p>c. Relate Mendelian principles to modern-day practice of plant and animal breeding.</p> | <p>Student Edition: 360-362 <i>Assessment 362 (#1-#6)</i> <i>Launch Lab 359</i> <i>MiniLab 361</i> <i>National Geographic: In the Field 286</i> Teacher Wraparound Edition: DC 360; FA 362; FUD 286; MI 360</p> |
| <p>d. Analyze bioethical issues and consider the role of science in determining public policy.</p> | <p>Student Edition: 15, 256-257, 363, 370-371, 378 <i>Biology & Society 258, 680, 1066, 1096</i> Teacher Wraparound Edition: AG 680; DC 15, 257, 363; DIB 680, 1066; RS 370</p> |

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| Objective 3: Explain how the structure and replication of DNA are essential to heredity and protein synthesis. | |
| a. Use a model to describe the structure of DNA. | Student Edition: <i>MiniLab</i> 331 Teacher Wraparound Edition: AC 329, 350; DC 171; DE 170, 330 |
| b. Explain the importance of DNA replication in cell reproduction. | Student Edition: 246-247, 333-335 <i>Assessment</i> 247 (#3) <i>MiniLab</i> 334 Teacher Wraparound Edition: CT 333; DC 335 |
| c. Summarize how genetic information encoded in DNA provides instructions for assembling protein molecules. | Student Edition: 336-338, 340-341 <i>Assessment</i> 341 (#1) <i>National Geographic</i> 339 Teacher Wraparound Edition: CT 338; DE 339; MI 336 |
| d. Describe how mutations may affect genetic expression and cite examples of mutagens. | Student Edition: 345-349 <i>Assessment</i> 349 (#1, #2, #4) <i>Data Analysis Lab</i> 348 Teacher Wraparound Edition: DC 347; FA 349; WS 346 |
| e. Relate the historical events that led to our present understanding of DNA to the cumulative nature of science knowledge and technology. | Student Edition: 326-331 <i>Assessment</i> 332 (#1, #2) <i>BioDiscoveries</i> 350 <i>Launch Lab</i> 325 Teacher Wraparound Edition: CB 327; CT 327; DC 328; WS 327, 330 |
| f. Research, report, and debate genetic technologies that may improve the quality of life (e.g., genetic engineering, cloning, gene splicing). | Student Edition: 363-371, 372-376, 378-379 <i>Assessment</i> 371 (#3), 379 (#3, #4) <i>Biology & Society</i> 258, 680 <i>Data Analysis Lab</i> 376 <i>National Geographic: In the Field</i> 380, 952 Teacher Wraparound Edition: DC 363, 364; MI 372; RS 370 |

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| STANDARD V: Students will understand that biological diversity is a result of evolutionary processes. | |
| Objective 1: Relate principles of evolution to biological diversity. | |
| a. Describe the effects of environmental factors on natural selection. | Student Edition: 420, 428-429, 434-436 <i>BioLab</i> 443 <i>Data Analysis Lab</i> 435 Teacher Wraparound Edition: DE 429; SP 434; WS 435 |
| b. Relate genetic variability to a species' potential for adaptation to a changing environment. | Student Edition: 276, 283, 428-429, 434-436, 522 <i>Assessment</i> 430 (#6) Teacher Wraparound Edition: CT 522; DE 429 |
| c. Relate reproductive isolation to speciation. | Student Edition: 437, 438 Teacher Wraparound Edition: CT 437, 438; RS 437; SP 437 |
| d. Compare selective breeding to natural selection and relate the differences to agricultural practices. | Student Edition: 360-362, 419-420 <i>Assessment</i> 362 (#1-#5) <i>Data Analysis Lab</i> 420 <i>Launch Lab</i> 359 <i>MiniLab</i> 361 Teacher Wraparound Edition: CT 362; WS 363 |
| Objective 2: Cite evidence for changes in populations over time and use concepts of evolution to explain these changes. | |
| a. Cite evidence that supports biological evolution over time (e.g., geologic and fossil records, chemical mechanisms, DNA structural similarities, homologous and vestigial structures). | Student Edition: 393-396, 423-428, 495 <i>Assessment</i> 430 (#1-#5) Teacher Wraparound Edition: DC 428; MI 423; RS 425 |
| b. Identify the role of mutation and recombination in evolution. | Student Edition: 276, 345-347, 434, 495 Teacher Wraparound Edition: DC 276, 434; RS 495 |

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| c. Relate the nature of science to the historical development of the theory of evolution. | <p>Student Edition: 11, 418-420, 422 <i>Assessment</i> 422 (#1, #4)</p> <p>Teacher Wraparound Edition: CB 12</p> |
| d. Distinguish between observations and inferences in making interpretations related to evolution (e.g., observed similarities and differences in the beaks of Galapagos finches leads to the inference that they evolved from a common ancestor; observed similarities and differences in the structures of birds and reptiles leads to the inference that birds evolved from reptiles). | <p>Student Edition: 418-419, 423-428, 430 <i>Assessment</i> 430 (#5) <i>National Geographic: In the Field</i> 408</p> <p>Teacher Wraparound Edition: CB 12; DC 422; DE 420, 425; RS 419</p> |
| e. Review a scientific article and identify the research methods used to gather evidence that documents the evolution of a species. | <p>The following references can be used to meet this standard.</p> <p>Student Edition: 430 <i>Cutting-Edge Biology</i> 442 <i>Data Analysis Lab</i> 420 <i>National Geographic: In the Field</i> 408</p> <p>Teacher Wraparound Edition: CB 12; CT 18; DC 432; WS 435, 439</p> |
| <p>Objective 3: Classify organisms into a hierarchy of groups based on similarities that reflect their evolutionary relationships.</p> | |
| a. Classify organisms using a classification tool such as a key or field guide. | <p>Student Edition: <i>BioLab</i> 137, 623, 899 <i>MiniLab</i> 488, 666, 866</p> <p>Teacher Wraparound Edition: CT 487; DC 488</p> |
| b. Generalize criteria used for classification of organisms (e.g., dichotomy, structure, broad to specific). | <p>Student Edition: 486-488, 499 <i>Launch Lab</i> 483 <i>MiniLab</i> 488</p> <p>Teacher Wraparound Edition: AC 487; DC 489</p> |

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| <p>c. Explain how evolutionary relationships are related to classification systems.</p> | <p>Student Edition: 486, 490-496, 498, 499 <i>Assessment</i> 489 (#3) <i>BioLab</i> 505 <i>National Geographic</i> 497 Teacher Wraparound Edition: CB 485</p> |
| <p>d. Justify the ongoing changes to classification schemes used in biology.</p> | <p>Student Edition: 490-491, 499 <i>Assessment</i> 503 (#5) <i>Cutting-Edge Biology</i> 504 <i>Reference Handbook</i> 1123 Teacher Wraparound Edition: CB 499; RS 490</p> |