



Science

LEVEL RED

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STANDARDS

PAGE REFERENCES

STATE GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

Why This Goal Is Important: The inquiry process prepares learners to engage in science and apply methods of technological design. This understanding will enable students to pose questions, use models to enhance understanding, make predictions, gather and work with data, use appropriate measurement methods, analyze results, draw conclusions based on evidence, communicate their methods and results, and think about the implications of scientific research and technological problem solving.

A. Know and apply the concepts, principles and processes of scientific inquiry.

11.A.3a Formulate hypotheses that can be tested by collecting data.

Student Edition:

MiniLAB 14

Design Your Own Lab 60-61, 88-89, 244-245, 332-333, 364-365, 488-489, 520-521, 580-581

Teacher Wraparound Edition:

A 489; IL 17

Teacher Resources:

The Nature of Science 4

Ecology 7-8

Earth's Resources 7-8

STANDARDS	PAGE REFERENCES
<p>11.A.3b Conduct scientific experiments that control all but one variable.</p>	<p>Student Edition: 12-20 <i>Design Your Own Lab</i> 60-61, 88-89, 244-245, 332-333, 488-489, 520-521, 580-581, 636-637 <i>Lab</i> 184-185</p> <p>Teacher Wraparound Edition: QD 18</p> <p>Teacher Resources: <i>The Nature of Science</i> 11-12 <i>Matter and Its Changes</i> 7-8 <i>Weathering and Erosion</i> 13-16</p>
<p>11.A.3c Collect and record data accurately using consistent measuring and recording techniques and media.</p>	<p>Student Edition: 12-20 <i>MiniLAB</i> 44 <i>Lab</i> 55, 183, 184-185 <i>Design Your Own Lab</i> 60-61, 88-89, 244-245, 332-333, 364-365</p> <p>Teacher Wraparound Edition: IL 17</p> <p>Teacher Resources: <i>Measurement</i> 9-10 <i>Motion, Forces, and Simple Machines</i> 13-14 <i>Energy</i> 7-8</p>
<p>11.A.3d Explain the existence of unexpected results in a data set.</p>	<p>Student Edition: 16, 27-30 <i>Lab</i> 31 <i>Communicating Your Data</i> 185, 637</p> <p>Teacher Wraparound Edition: EA 61, 119, 279, 333, 521, 637; SCB 4F</p> <p>Teacher Resources: <i>The Nature of Science</i> 32</p>
<p>11.A.3e Use data manipulation tools and quantitative (e.g., mean, mode, simple equations) and representational methods (e.g., simulations, image processing) to analyze measurements.</p>	<p>Student Edition: <i>MiniLAB</i> 138 <i>Use the Internet Lab</i> 152-153, 430-431 <i>Lab</i> 183, 236, 654 <i>Design Your Own Lab</i> 244-245, 332-333</p> <p>Teacher Wraparound Edition: CYD 33, 112; R 135</p> <p>Teacher Resources: <i>Motion, Forces, and Simple Machines</i> 7-8</p>

STANDARDS	PAGE REFERENCES
<p>11.A.3f Interpret and represent results of analysis to produce findings.</p>	<p>Student Edition: 27-30 <i>Lab 31</i>, 184-185, 278-279 <i>Design Your Own Lab</i> 60-61, 88-89, 244-245, 332-333 <i>Use the Internet Lab</i> 152-153 <i>Model and Invent Lab</i> 306-307</p> <p>Teacher Resources: Electricity and Magnetism 9-12 Rocks and Minerals 13-16 The Atmosphere in Motion 9-11</p>
<p>11.A.3g Report and display the process and results of a scientific investigation.</p>	<p>Student Edition: 27-30 <i>Communicating Your Data</i> 31, 551, 607 <i>Design Your Own Lab</i> 60-61, 88-89, 244-245, 364-365 <i>Use the Internet Lab</i> 152-153 <i>Lab</i> 184-185, 278-279 <i>Model and Invent Lab</i> 306-307</p> <p>Teacher Resources: Forces Shaping Earth 7-8 Cells—The Units of Life 7-8 The Role of Genes in Inheritance 7-8</p>
<p>B. Know and apply the concepts, principles and processes of technological design.</p>	
<p>11.B.3a Identify an actual design problem and establish criteria for determining the success of a solution.</p>	<p>Student Edition: <i>Lab</i> 414 <i>Design Your Own Lab</i> 464-465, 668-669</p> <p>Teacher Wraparound Edition: ACT 432; IL 263, 353; MM 542; UP 127</p> <p>Teacher Resources: The Atmosphere in Motion 9-10 Exploring Space 5-6 Earth's Resources 9-11</p>
<p>11.B.3b Sketch, propose and compare design solutions to the problem considering available materials, tools, cost effectiveness and safety.</p>	<p>Student Edition: <i>Design Your Own Lab</i> 464-465, 668-669</p> <p>Teacher Wraparound Edition: ACT 432; IL 263; UP 127</p> <p>Teacher Resources: The Atmosphere in Motion 9-10</p>

STANDARDS	PAGE REFERENCES
<p>11.B.3c Select the most appropriate design and build a prototype or simulation.</p>	<p>Student Edition: <i>Lab 414</i> <i>Design Your Own Lab 464-465, 668-669</i></p> <p>Teacher Wraparound Edition: IL 263, 353; MM 542; UP 127</p> <p>Teacher Resources: <i>The Atmosphere in Motion 9-10</i> <i>Exploring Space 5-6</i> <i>Earth's Resources 9-11</i></p>
<p>11.B.3d Test the prototype using available materials, instruments and technology and record the data.</p>	<p>Student Edition: <i>Lab 414</i></p> <p>Teacher Wraparound Edition: IL 353; MM 542; UP 12</p> <p>Teacher Resources: <i>The Atmosphere in Motion 9-10</i> <i>Exploring Space 5-6</i> <i>Earth's Resources 9-11</i></p>
<p>11.B.3e Evaluate the test results based on established criteria, note sources of error and recommend improvements.</p>	<p>Student Edition: <i>Design Your Own Lab 464-465, 668-669</i></p> <p>Teacher Wraparound Edition: UP 127</p> <p>Teacher Resources: <i>The Atmosphere in Motion 9-10</i> <i>Earth's Resources 9-11</i></p>
<p>11.B.3f Using available technology, report the relative success of the design based on the test results and criteria.</p>	<p>Student Edition: <i>Lab 414</i> <i>Design Your Own Lab 668-669</i></p> <p>Teacher Wraparound Edition: UP 127</p> <p>Teacher Resources: <i>The Atmosphere in Motion 9-10</i> <i>Exploring Space 5-6</i> <i>Earth's Resources 9-11</i></p>

STANDARDS	PAGE REFERENCES
<p>STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.</p>	
<p>Why This Goal Is Important: This goal is comprised of key concepts and principles in the life, physical and earth/space sciences that have considerable explanatory and predictive power for scientists and non-scientists alike. These ideas have been thoroughly studied and have stood the test of time. Knowing and being able to apply these concepts, principles and processes help students understand what they observe in nature and through scientific experimentation. A working knowledge of these concepts and principles allows students to relate new subject matter to material previously learned and to create deeper and more meaningful levels of understanding.</p>	
<p>A. Know and apply concepts that explain how living things function, adapt and change.</p>	
<p>12.A.3a Explain how cells function as “building blocks” of organisms and describe the requirements for cells to live.</p>	<p>Student Edition: 476-481, 483-487, 493#22 <i>Lab 482</i></p> <p>Teacher Wraparound Edition: A 487; DIS 485; SCB 474E-F; UAA 479; VL 484</p> <p>Teacher Resources: <i>Cells—The Units of Life 20, 21, 29, 31</i></p>
<p>12.A.3b Compare characteristics of organisms produced from a single parent with those of organisms produced by two parents.</p>	<p>Student Edition: 501-505, 527#11, 535-539, 545-548, 574-579, 593-597 <i>MiniLAB 593</i></p> <p>Teacher Wraparound Edition: IL 513; R 597; TPK 541, 599; VL 503</p> <p>Teacher Resources: <i>The Role of Genes in Inheritance 25, 37</i></p>
<p>12.A.3c Compare and contrast how different forms and structures reflect different functions (e.g., similarities and differences among animals that fly, walk or swim; structures of plant cells and animal cells).</p>	<p>Student Edition: 389-390, 483-487, 499, 517-518, 530-534, 541-544 <i>MiniLAB 484, 543</i></p> <p>Teacher Wraparound Edition: ACT 499; CFU 487; DI 485; QD 543</p> <p>Teacher Resources: <i>Invertebrate Animals 13-16</i> <i>Vertebrate Animals 9-11, 27</i></p>

STANDARDS	PAGE REFERENCES
B. Know and apply concepts that describe how living things interact with each other and with their environment.	
<p>12.B.3a Identify and classify biotic and abiotic factors in an environment that affect population density, habitat and placement of organisms in an energy pyramid.</p>	<p>Student Edition: 618-625, 627-632, 633-635 <i>Design Your Own Lab</i> 636-637</p> <p>Teacher Wraparound Edition: A 625; DI 624; DIS 392; QD 631; SCB 616E; SJ 621, 629; V 393</p> <p>Teacher Resources: <i>Ecology</i> 9-10, 23, 24</p>
<p>12.B.3b Compare and assess features of organisms for their adaptive, competitive and survival potential (e.g., appendages, reproductive rates, camouflage, defensive structures).</p>	<p>Student Edition: 535-539, 541-544</p> <p>Teacher Wraparound Edition: ACT 547; CFU 539, 544, 625; DI 515; FF 514; QD 536, 624; TPK 535; VL 541</p> <p>Teacher Resources: <i>Vertebrate Animals</i> 19, 33-35</p>
C. Know and apply concepts that describe properties of matter and energy and the interactions between them.	
<p>12.C.3a Explain interactions of energy with matter including changes of state and conservation of mass and energy.</p>	<p>Student Edition: 73-75, 80-86, 93#23, 93#25, 168-169 <i>Applying Science</i> 85</p> <p>Teacher Wraparound Edition: A 86; DI 85; IL 85; QD 75; R 86; SCB 68E-F; TFYI 73</p> <p>Teacher Resources: <i>Matter and Its Changes</i> 29, 30</p>
<p>12.C.3b Model and describe the chemical and physical characteristics of matter (e.g., atoms, molecules, elements, compounds, mixtures).</p>	<p>Student Edition: 70-79, 80-86, 98-105, 106-111, 113-117 <i>Science Online</i> 71 <i>Lab</i> 118-119</p> <p>Teacher Wraparound Edition: A 79; DI 77; MM 74; QD 116; VL 74</p> <p>Teacher Resources: <i>Matter and Its Changes</i> 9-11 <i>Atoms, Elements, and the Periodic Table</i> 9-10, 11-12</p>

STANDARDS	PAGE REFERENCES
D. Know and apply concepts that describe force and motion and the principles that explain them.	
<p>12.D.3a Explain and demonstrate how forces affect motion (e.g., action/reaction, equilibrium conditions, free-falling objects).</p>	<p>Student Edition: 130-135, 136-143, 157#26 <i>Integrate Life Science</i> 137 <i>Lab</i> 151</p> <p>Teacher Wraparound Edition: ACT 137; IM 128F, 140; LD 141; QD 137; SCB 128E; VL 139</p> <p>Teacher Resources: <i>Motion, Forces, and Simple Machines</i> 13-14, 26, 29</p>
<p>12.D.3b Explain the factors that affect the gravitational forces on objects (e.g., changes in mass, distance).</p>	<p>Student Edition: 387, 445-446</p> <p>Teacher Wraparound Edition: QD 387</p>
E. Know and apply concepts that describe the features and processes of the Earth and its resources.	
<p>12.E.3a Analyze and explain large-scale dynamic forces, events and processes that affect the Earth's land, water and atmospheric systems (e.g., jetstream, hurricanes, plate tectonics).</p>	<p>Student Edition: 288-297, 299-305, 348-355, 356-362, 380-384 <i>Science Online</i> 293, 381 <i>MiniLAB</i> 295 <i>Lab</i> 298</p> <p>Teacher Wraparound Edition: QD 292; SCB 286E-F, 340E-F</p> <p>Teacher Resources: <i>Energy</i> 29 <i>The Atmosphere in Motion</i> 13-16, 30</p>
<p>12.E.3b Describe interactions between solid earth, oceans, atmosphere and organisms that have resulted in ongoing changes of Earth (e.g., erosion, El Nino).</p>	<p>Student Edition: 316-321, 323-331, 345-346, 380-384, 403 #12 <i>Science Online</i> 302, 330 <i>Launch Lab</i> 315</p> <p>Teacher Wraparound Edition: CFU 321; DI 319; IM 314F</p> <p>Teacher Resources: <i>Weathering and Erosion</i> 28, 29, 30 <i>Oceans</i> 28</p>

STANDARDS	PAGE REFERENCES
<p>12.E.3c Evaluate the biodegradability of renewable and nonrenewable natural resources.</p>	<p>Student Edition: 646-653, 655-662, 663-667 <i>MiniLAB</i> 650 <i>Applying Science</i> 665 <i>Science and Society</i> 670 Teacher Wraparound Edition: IM 657; QD 666; R 667; SCB 644E; TFYI 657, 666; TPK 655 Teacher Resources: <i>Earth's Resources</i> 31, 33-35</p>
<p>F. Know and apply concepts that explain the composition and structure of the universe and Earth's place in it.</p>	
<p>12.F.3a Simulate, analyze and explain the effects of gravitational force in the solar system (e.g., orbital shape and speed, tides, spherical shape of the planets and moons).</p>	<p>Student Edition: 387, 417, 445-446, 448 <i>National Geographic</i> 142 Teacher Wraparound Edition: IA 466; QD 387 Teacher Resources: <i>Oceans</i> 29</p>
<p>12.F.3b Describe the organization and physical characteristics of the solar system (e.g., sun, planets, satellites, asteroids, comets).</p>	<p>Student Edition: 440-446, 448-455, 469#19 <i>MiniLAB</i> 450 <i>Applying Science</i> 453 Teacher Wraparound Edition: ACT 450, 452; CFU 455; DI 449; DIS 454; QD 451; R 455; SJ 452 Teacher Resources: <i>The Solar System and Beyond</i> 13-16, 17, 19, 21, 28, 33-35, 39-41, 45, 46, 49</p>
<p>12.F.3c Compare and contrast the sun as a star with other objects in the Milky Way Galaxy (e.g., nebulae, dust clouds, stars, black holes).</p>	<p>Student Edition: 456-463 <i>MiniLAB</i> 457 <i>Integrate Physics</i> 458 Teacher Wraparound Edition: CFU 463; DI 458; SJ 458; TFYI 458, 460 Teacher Resources: <i>Exploring Space</i> 9-10, 11-12 <i>The Solar System and Beyond</i> 29, 46</p>

STANDARDS	PAGE REFERENCES
<p>STATE GOAL 13: Understand the relationships among science, technology and society in historical and contemporary contexts.</p>	
<p>Why This Goal Is Important: Understanding the nature and practices of science such as ensuring the validity and replicability of results, building upon the work of others and recognizing risks involved in experimentation gives learners a useful sense of the scientific enterprise. In addition, the relationships among science, technology and society give humans the ability to change and improve their surroundings. Learners who understand this relationship will be able to appreciate the efforts and effects of scientific discovery and applications of technology on their own lives and on the society in which we live.</p>	
<p>A. Know and apply the accepted practices of science.</p>	
<p>13.A.3a Identify and reduce potential hazards in science activities (e.g., ventilation, handling chemicals).</p>	<p>Student Edition: 19-20 <i>Design Your Own Lab</i> 60-61, 88-89, 332-333, 488-489, 520-521, 580-581 <i>Lab</i> 174-185, 278-279, 414</p> <p>Teacher Wraparound Edition: CC 19; VL 19</p> <p>Teacher Resources: <i>The Nature of Science</i> 7-8 <i>Matter and Its Changes</i> 7-8 <i>Rocks and Minerals</i> 5-6</p>
<p>13.A.3b Analyze historical and contemporary cases in which the work of science has been affected by both valid and biased scientific practices.</p>	<p>Student Edition: 27-30, 90-105, 138-143 <i>Integrate Astronomy</i> 51 <i>Science and History</i> 90 <i>Integrate History</i> 174 <i>Accidents in Science</i> 552</p> <p>Teacher Wraparound Edition: DI 110; SCB 4F</p> <p>Teacher Resources: <i>The Nature of Science</i> 32, 34</p>
<p>13.A.3c Explain what is similar and different about observational and experimental investigations.</p>	<p>Student Edition: 12-20 <i>Integrate Career</i> 13</p> <p>Teacher Wraparound Edition: A 23; IL 17</p> <p>Teacher Resources: <i>The Nature of Science</i> 11-14</p>

STANDARDS	PAGE REFERENCES
B. Know and apply concepts that describe the interaction between science, technology and society.	
<p>13.B.3a Identify and explain ways that scientific knowledge and economics drive technological development.</p>	<p>Student Edition: 11, 408-413 <i>National Geographic</i> 142 <i>Science and History</i> 218 <i>Science and Society</i> 432</p> <p>Teacher Wraparound Edition: DIS 426</p> <p>Teacher Resources: <i>Exploring Space</i> 28 <i>The Role of Genes in Inheritance</i> 28</p>
<p>13.B.3b Identify important contributions to science and technology that have been made by individuals and groups from various cultures.</p>	<p>Student Edition: 90-105, 138-143 <i>Science and History</i> 34, 90, 218, 582 <i>Integrate History</i> 198</p> <p>Teacher Wraparound Edition: CC 15, 416; CD 166, 292, 479, 516; TFYI 108</p> <p>Teacher Resources: <i>Oceans</i> 31</p>
<p>13.B.3c Describe how occupations use scientific and technological knowledge and skills.</p>	<p>Student Edition: 408-413, 415-422, 423-429 <i>Integrate Career</i> 43, 104, 442, 485, 538, 604 <i>Science Online</i> 47, 361</p> <p>Teacher Wraparound Edition: DI 10</p> <p>Teacher Resources: <i>Forces Shaping Earth</i> 32 <i>The Atmosphere in Motion</i> 32 <i>Exploring Space</i> 29-31</p>
<p>13.B.3d Analyze the interaction of resource acquisition, technological development and ecosystem impact (e.g., diamond, coal or gold mining; deforestation).</p>	<p>Student Edition: 646-653, 655-662 <i>Science and History</i> 334</p> <p>Teacher Wraparound Edition: CB 334; CC 330; CD 658; DI 263, 393; DIS 262; SJ 656</p> <p>Teacher Resources: <i>Earth's Resources</i> 21, 28, 31, 33-35</p>

STANDARDS	PAGE REFERENCES
<p>13.B.3e Identify advantages and disadvantages of natural resource conservation and management programs.</p>	<p>Student Edition: 655-662, 663-667 <i>Model and Invent Lab</i> 550-551 <i>Science and Society</i> 638, 670 <i>Design Your Own Lab</i> 668-669</p> <p>Teacher Wraparound Edition: AIL 668</p> <p>Teacher Resources: <i>Weathering and Erosion</i> 29 <i>Oceans</i> 34 <i>Ecology</i> 26 <i>Earth's Resources</i> 7-8</p>
<p>13.B.3f Apply classroom-developed criteria to determine the effects of policies on local science and technology issues (e.g., energy consumption, landfills, water quality).</p>	<p>Student Edition: <i>Lab</i> 654</p> <p>Teacher Wraparound Edition: A 654; DI 657, 666; UP 615</p> <p>Teacher Resources: <i>Earth's Resources</i> 5-6</p>