



# Science

LEVEL BLUE

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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:**

13, 21-23

*Design Your Own Lab* 112-113, 510-511, 570-571, 598-599, 624-625

*Science and History* 426

*Science and Society* 56

*Science Skill Handbook* 727-728

**Teacher Wraparound Edition:**

A 21

**Teacher Resources:**

*The Nature of Science* 9-10, 17

STANDARDS	PAGE REFERENCES
<p><b>11.A.3b</b> Conduct scientific experiments that control all but one variable.</p>	<p><b>Student Edition:</b>            21, 47-48  <i>Design Your Own Lab</i> 112-113, 624-625  <i>Lab</i> 326-327, 585  <i>Launch Lab</i> 549  <i>Science Skill Handbook</i> 728</p> <p><b>Teacher Wraparound Edition:</b>            CU 48</p> <p><b>Teacher Resources:</b>  <i>The Nature of Science</i> 9-13  <i>Traits and How They Change</i> 45-47</p>
<p><b>11.A.3c</b> Collect and record data accurately using consistent measuring and recording techniques and media.</p>	<p><b>Student Edition:</b>            16-18  <i>Applying Science</i> 14, 469  <i>Lab</i> 12, 321, 326-327  <i>Math Skill Handbook</i> 765-766  <i>Science Skill Handbook</i> 728-731  <i>Technology Skill Handbook</i> 749-750</p> <p><b>Teacher Wraparound Edition:</b>            QD 17</p> <p><b>Teacher Resources:</b>  <i>The Nature of Science</i> 4, 5, 9  <i>Traits and How They Change</i> 5-6, 7-8</p>
<p><b>11.A.3d</b> Explain the existence of unexpected results in a data set.</p>	<p><b>Student Edition:</b>            389, 408-411, 412-413, 435  <i>Accidents in Science</i> 264, 716  <i>Integrate History</i> 75  <i>Integrate Physics</i> 382  <i>National Geographic</i> 518-519  <i>Science and Society</i> 658</p> <p><b>Teacher Wraparound Edition:</b>            FF 21, 676; FYI 75, 419</p> <p><b>Teacher Resources:</b>  <i>Inside the Atom</i> 41-42</p>

STANDARDS	PAGE REFERENCES
<p><b>11.A.3e</b> 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><b>Student Edition:</b>  18-19, 53, 102, 105  <i>Applying Science</i> 14  <i>Lab</i> 28-29, 54-55, 112-113  <i>Math Skill Handbook</i> 758  <i>National Geographic</i> 104  <i>Technology Skill Handbook</i> 750  <b>Teacher Wraparound Edition:</b>  CYD 29, 113, 425  <b>Teacher Resources:</b>  <i>Force and Newton's Laws</i> 9-12, 13-16  <i>Plate Tectonics</i> 5-6, 9-12</p>
<p><b>11.A.3f</b> Interpret and represent results of analysis to produce findings.</p>	<p><b>Student Edition:</b>  182-185, 388-391, 404-413, 434-435  <i>Accidents in Science</i> 264, 716  <i>Integrate Physics</i> 340  <i>Science Skill Handbook</i> 731-732  <b>Teacher Wraparound Edition:</b>  AS 27; DIN 8; QD 10  <b>Teacher Resources:</b>  <i>Force and Newton's Laws</i> 13-16  <i>The Nature of Science</i> 5-6, 9-10</p>
<p><b>11.A.3g</b> Report and display the process and results of a scientific investigation.</p>	<p><b>Student Edition:</b>  10-11, 19  <i>Design Your Own Lab</i> 112-113, 392-393, 510-511, 570-571, 624-625  <i>Science and History</i> 114  <i>Science Skill Handbook</i> 732  <i>Technology Skill Handbook</i> 751  <b>Teacher Wraparound Edition:</b>  A 114; TPK 13  <b>Teacher Resources:</b>  <i>Ecosystems</i> 11-14  <i>The Nature of Science</i> 9-10</p>

STANDARDS	PAGE REFERENCES
<b>B. Know and apply the concepts, principles and processes of technological design.</b>	
<p><b>11.B.3a</b> Identify an actual design problem and establish criteria for determining the success of a solution.</p>	<p><b>Student Edition:</b>  <i>Accidents in Science</i> 716  <i>Integrate Life Science</i> 670  <i>Integrate Physics</i> 308  <i>Lab</i> 672  <i>MiniLab</i> 308  <i>National Geographic</i> 90-91  <i>Science and Society</i> 572, 600  <b>Teacher Wraparound Edition:</b>            CU 671; VL 670  <b>Teacher Resources:</b>  <i>Magnetism</i> 5-6, 9-10</p>
<p><b>11.B.3b</b> Sketch, propose and compare design solutions to the problem considering available materials, tools, cost effectiveness and safety.</p>	<p><b>Student Edition:</b>  <i>Integrate Physics</i> 308  <i>Lab</i> 672  <i>MiniLab</i> 308  <b>Teacher Wraparound Edition:</b>            CC 308; CYD 672  <b>Teacher Resources:</b>  <i>Magnetism</i> 5-6, 9-10</p>
<p><b>11.B.3c</b> Select the most appropriate design and build a prototype or simulation.</p>	<p><b>Student Edition:</b>  <i>Integrate Physics</i> 308  <i>Lab</i> 672  <i>MiniLab</i> 308  <b>Teacher Wraparound Edition:</b>            CA 672  <b>Teacher Resources:</b>  <i>Magnetism</i> 5-6, 9-10</p>
<p><b>11.B.3d</b> Test the prototype using available materials, instruments and technology and record the data.</p>	<p><b>Student Edition:</b>  <i>Applying Science</i> 669  <i>Integrate Physics</i> 308  <i>Lab</i> 672  <i>MiniLab</i> 308  <b>Teacher Wraparound Edition:</b>            CA 672  <b>Teacher Resources:</b>  <i>Magnetism</i> 5-6, 9-10</p>

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<p><b>11.B.3e</b> Evaluate the test results based on established criteria, note sources of error and recommend improvements.</p>	<p><b>Student Edition:</b>  <i>Applying Science</i> 669  <i>Integrate Physics</i> 308  <i>Lab</i> 672  <i>MiniLab</i> 308  <b>Teacher Wraparound Edition:</b>            CA 672  <b>Teacher Resources:</b>  <i>Magnetism</i> 5-6, 9-10</p>
<p><b>11.B.3f</b> Using available technology, report the relative success of the design based on the test results and criteria.</p>	<p><b>Student Edition:</b>  <i>Communicate Your Data</i> 672  <i>MiniLab</i> 308  <b>Teacher Wraparound Edition:</b>            CYD 672  <b>Teacher Resources:</b>  <i>Magnetism</i> 5-6, 9-10</p>
<p><b>STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.</b></p>	
<p><b>Why This Goal Is Important:</b> 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><b>A. Know and apply concepts that explain how living things function, adapt and change.</b></p>	
<p><b>12.A.3a</b> Explain how cells function as “building blocks” of organisms and describe the requirements for cells to live.</p>	<p><b>Student Edition:</b>            64, 68-71, 73, 76-77  <i>Lab</i> 72  <i>National Geographic</i> 638  <b>Teacher Wraparound Edition:</b>            UA 70; USW 77  <b>Teacher Resources:</b>  <i>Interactions of Human Systems</i> 5-6, 15-17</p>
<p><b>12.A.3b</b> Compare characteristics of organisms produced from a single parent with those of organisms produced by two parents.</p>	<p><b>Student Edition:</b>            38-39, 45-48  <b>Teacher Wraparound Edition:</b>            CU 48; FYI 47; TPK 38, 44; VL 39  <b>Teacher Resources:</b>  <i>Traits and How They Change</i> 45-47</p>

STANDARDS	PAGE REFERENCES
<p><b>12.A.3c</b> 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><b>Student Edition:</b> 52-53, 282-284, 290, 293 <i>National Geographic</i> 51</p> <p><b>Teacher Wraparound Edition:</b> CU 286; VL 168, 284</p> <p><b>Teacher Resources:</b> <i>Traits and How They Change</i> 4, 7-8</p>
<p><b>B. Know and apply concepts that describe how living things interact with each other and with their environment.</b></p>	
<p><b>12.B.3a</b> 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><b>Student Edition:</b> 122-128, 138-139, 154-161, 163-169 <i>Lab</i> 129, 162 <i>Use the Internet Lab</i> 170-171</p> <p><b>Teacher Wraparound Edition:</b> FYI 155, 165; IL 168</p> <p><b>Teacher Resources:</b> <i>Ecosystems</i> 4, 5-6 <i>The Nonliving Environment</i> 5-6, 27</p>
<p><b>12.B.3b</b> Compare and assess features of organisms for their adaptive, competitive and survival potential (e.g., appendages, reproductive rates, camouflage, defensive structures).</p>	<p><b>Student Edition:</b> 49-50, 52-53, 282-284, 290, 293 <i>Lab</i> 54-55 <i>National Geographic</i> 51</p> <p><b>Teacher Wraparound Edition:</b> CU 286; IM 50; VL 168, 284</p> <p><b>Teacher Resources:</b> <i>Traits and How They Change</i> 4, 7-8</p>
<p><b>C. Know and apply concepts that describe properties of matter and energy and the interactions between them.</b></p>	
<p><b>12.C.3a</b> Explain interactions of energy with matter including changes of state and conservation of mass and energy.</p>	<p><b>Student Edition:</b> 136-137, 496, 612-617, 619 <i>Applying Math</i> 498 <i>Design Your Own Lab</i> 510-511, 624-625 <i>Integrate Chemistry</i> 228 <i>Lab</i> 326-327, 618 <i>MiniLab</i> 496</p> <p><b>Teacher Wraparound Edition:</b> FYI 138; LD 616</p> <p><b>Teacher Resources:</b> <i>Chemical Reactions</i> 3 <i>Thermal Energy</i> 3, 5-6</p>

STANDARDS	PAGE REFERENCES
<p><b>12.C.3b</b> Model and describe the chemical and physical characteristics of matter (e.g., atoms, molecules, elements, compounds, mixtures).</p>	<p><b>Student Edition:</b>            405-413, 415-418, 434-439, 441-447, 448-450, 464-469, 472-476  <i>Lab</i> 453, 481  <i>Science and History</i> 512  <b>Teacher Wraparound Edition:</b>            DI 412; IL 408; SJ 410  <b>Teacher Resources:</b>  <i>Atomic Structure and Chemical Bonds</i> 4, 7-8  <i>Inside the Atom</i> 9-10, 11-12  <i>The Periodic Table</i> 5-6</p>
<p><b>D. Know and apply concepts that describe force and motion and the principles that explain them.</b></p>	
<p><b>12.D.3a</b> Explain and demonstrate how forces affect motion (e.g., action/reaction, equilibrium conditions, free-falling objects).</p>	<p><b>Student Edition:</b>            550-555, 556-561, 563-568, 580-582  <i>Design Your Own Lab</i> 570-571, 598-599  <i>Lab</i> 569  <i>Launch Lab</i> 549  <i>Science and Society</i> 572  <b>Teacher Wraparound Edition:</b>            CC 557; CU 555; IM 558; TPK 563; USW 551; VL 560  <b>Teacher Resources:</b>  <i>Force and Newton's Laws</i> 7-8, 13-16, 33-34  <i>Work and Simple Machines</i> 5-6, 7-8</p>
<p><b>12.D.3b</b> Explain the factors that affect the gravitational forces on objects (e.g., changes in mass, distance).</p>	<p><b>Student Edition:</b>            557  <i>Integrate History</i> 557  <i>MiniLab</i> 345  <b>Teacher Wraparound Edition:</b>            CC 557  <b>Teacher Resources:</b>  <i>The Solar System</i> 3            Note: Newton's law of universal gravitation is not explicitly given, but it is the basis for the calculation of weight.</p>

STANDARDS	PAGE REFERENCES
<b>E. Know and apply concepts that describe the features and processes of the Earth and its resources.</b>	
<p><b>12.E.3a</b> 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><b>Student Edition:</b>  182-185, 186-188, 190-199, 210-218, 219-224, 226-231  <i>Lab</i> 189, 225, 232-233  <i>National Geographic</i> 193, 216  <i>Science and History</i> 234  <i>Use the Internet Lab</i> 200-201</p> <p><b>Teacher Wraparound Edition:</b>  CC 197; CD 195; D 183, 188, 222, 229; FF 191; FYI 187, 198, 212; LD 223; MM 196; R 231; SJ 213; VL 194, 227</p> <p><b>Teacher Resources:</b>  <i>Earthquakes and Volcanoes</i> 5-6, 27  <i>Plate Tectonics</i> 5-6, 7-8, 29-30</p>
<p><b>12.E.3b</b> Describe interactions between solid earth, oceans, atmosphere and organisms that have resulted in ongoing changes of Earth (e.g., erosion, El Nino).</p>	<p><b>Student Edition:</b>  280-281, 285, 292  <i>Integrate Chemistry</i> 281  <i>Integrate Earth Science</i> 128, 160  <i>National Geographic</i> 253  <i>Science and Society</i> 658  <i>Use the Internet Lab</i> 200-201</p> <p><b>Teacher Wraparound Edition:</b>  D 281; FF 160</p> <p><b>Teacher Resources:</b>  <i>Clues to Earth's Past</i> 9-11  <i>The Nonliving Environment</i> 13-16</p>
<p><b>12.E.3c</b> Evaluate the biodegradability of renewable and nonrenewable natural resources.</p>	<p><b>Student Edition:</b>  164-165, 420  <i>Integrate Life Science</i> 617  <i>Integrate Social Studies</i> 245  <i>Science and Society</i> 172  <i>Use the Internet Lab</i> 170-171</p> <p><b>Teacher Wraparound Edition:</b>  CC 151; FYI 165; SJ 498</p> <p><b>Teacher Resources</b>  <i>Ecosystems</i> 7-8</p> <p>Note: These references describe some effects on ecosystems of the biodegradability of byproducts from the acquisition and use of resources, rather than the degradability of the resources themselves.</p>

STANDARDS	PAGE REFERENCES
<b>F. Know and apply concepts that explain the composition and structure of the universe and Earth's place in it.</b>	
<p><b>12.F.3a</b> 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><b>Student Edition:</b> 337, 349, 356-357, 358 <i>Integrate Earth Science</i> 168 <i>MiniLab</i> 345 <i>National Geographic</i> 339</p> <p><b>Teacher Wraparound Edition:</b> D 337; FF 166, 343</p> <p><b>Teacher Resources:</b> <i>The Solar System 3</i>, 13-15</p>
<p><b>12.F.3b</b> Describe the organization and physical characteristics of the solar system (e.g., sun, planets, satellites, asteroids, comets).</p>	<p><b>Student Edition:</b> 309-311, 314-316, 336-337, 342-347, 348-355, 356-359 <i>Integrate Physics</i> 340 <i>Lab</i> 321, 326-327, 341 <i>MiniLab</i> 313 <i>Model and Invent Lab</i> 360-361</p> <p><b>Teacher Wraparound Edition:</b> D 337, 351, 357; FYI 309, 314, 343, 350; QD 344, 352; SJ 338; TPK 348, 356</p> <p><b>Teacher Resources:</b> <i>The Solar System 7-8</i>, 13-15, 31 <i>The Sun-Earth-Moon System 4</i>, 9-10</p>
<p><b>12.F.3c</b> 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><b>Student Edition:</b> 356-359, 374, 375-378, 380-385, 386-387 <i>Applying Science</i> 372 <i>Lab</i> 379</p> <p><b>Teacher Wraparound Edition:</b> D 385; FF 384; MM 382; QD 376, 381</p> <p><b>Teacher Resources:</b> <i>Stars and Galaxies</i> 5-6, 13-15 <i>The Solar System</i> 13-15</p>

## STANDARDS

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**STATE GOAL 13: Understand the relationships among science, technology and society in historical and contemporary contexts.**

**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.

**A. Know and apply the accepted practices of science.**

**13.A.3a** Identify and reduce potential hazards in science activities (e.g., ventilation, handling chemicals).

**Student Edition:**

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*Design Your Own Lab* 510-511

*Lab* 379, 509, 655

*Science Skill Handbook* 733-735

*Use the Internet Lab* 454-455

**Teacher Wraparound Edition:**

AIL 454; DI 76

**Teacher Resources:**

*The Nature of Science* 5-6, 11-13

**13.A.3b** Analyze historical and contemporary cases in which the work of science has been affected by both valid and biased scientific practices.

**Student Edition:**

15, 182-185, 434-435

*National Geographic* 518-519

*Science and Society* 56, 658

**Teacher Wraparound Edition:**

A 15; CC 17; DI 45; FYI 7, 10

**Teacher Resources:**

*The Nature of Science* 28

**13.A.3c** Explain what is similar and different about observational and experimental investigations.

**Student Edition:**

13-19, 21-23

*Accidents in Science* 362, 716

*Integrate Physics* 340

*Lab* 72, 129, 162

*National Geographic* 20

*Science and History* 328

**Teacher Wraparound Edition:**

CD 350; FYI 14, 349; IL 25; SJ 338

**Teacher Resources:**

*The Nature of Science* 3, 4, 9-10

STANDARDS	PAGE REFERENCES
<b>B. Know and apply concepts that describe the interaction between science, technology and society.</b>	
<p><b>13.B.3a</b> Identify and explain ways that scientific knowledge and economics drive technological development.</p>	<p><b>Student Edition:</b>  24-27  <i>Design Your Own Lab</i> 540-541, 624-625  <i>Integrate History</i> 507  <i>Integrate Social Studies</i> 534  <i>Lab</i> 672  <i>Science and History</i> 512  <i>Science and Society</i> 172, 572, 600</p> <p><b>Teacher Wraparound Edition:</b>  D 26</p> <p><b>Teacher Resources:</b>  <i>Magnetism</i> 5-6, 11-12</p>
<p><b>13.B.3b</b> Identify important contributions to science and technology that have been made by individuals and groups from various cultures.</p>	<p><b>Student Edition:</b>  26, 44-48, 182-185, 187, 261, 274-276, 336-337, 389-391, 434-437, 496  <i>Accidents in Science</i> 264  <i>Integrate History</i> 75  <i>Integrate Physics</i> 340</p> <p><b>Teacher Wraparound Edition:</b>  CD 10, 350; DI 39; FF 21, 351, 497; FYI 7, 75, 187, 552; SJ 191, 260</p> <p><b>Teacher Resources:</b>  <i>Force and Newton's Laws</i> 13-16, 27-29</p>
<p><b>13.B.3c</b> Describe how occupations use scientific and technological knowledge and skills.</p>	<p><b>Student Edition:</b>  26  <i>Integrate Career</i> 50, 127, 165, 197, 317, 467, 622  <i>Science and History</i> 426</p> <p><b>Teacher Wraparound Edition:</b>  FYI 47, 187; IC 50, 127, 165, 197, 317, 467, 622</p> <p><b>Teacher Resources:</b>  <i>Interactions of Human Systems</i> 9-13</p>

STANDARDS	PAGE REFERENCES
<p><b>13.B.3d</b> Analyze the interaction of resource acquisition, technological development and ecosystem impact (e.g., diamond, coal or gold mining; deforestation).</p>	<p><b>Student Edition:</b>  164-165, 420  <i>Integrate Life Science</i> 617  <i>Integrate Social Studies</i> 245  <i>National Geographic</i> 90-91  <i>Science and Society</i> 172  <i>Use the Internet Lab</i> 170-171  <b>Teacher Wraparound Edition:</b>  CC 151; FYI 165; SJ 498  <b>Teacher Resources</b>  <i>Ecosystems</i> 7-8</p>
<p><b>13.B.3e</b> Identify advantages and disadvantages of natural resource conservation and management programs.</p>	<p><b>Student Edition:</b>  132-133, 158-159, 164-165  <i>Integrate Environment</i> 420  <i>Science and Society</i> 172, 658  <i>Use the Internet Lab</i> 170-171  <b>Teacher Wraparound Edition:</b>  DI 132; FYI 157; VL 131  <b>Teacher Resources:</b>  <i>Ecosystems</i> 7-8</p>
<p><b>13.B.3f</b> 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><b>Student Edition:</b>  167, 217, 420  <i>Integrate Environment</i> 15  <i>National Geographic</i> 518-519  <b>Teacher Wraparound Edition:</b>  DI 420  <b>Teacher Resources:</b>  <i>Ecosystems</i> 7-8  <i>The Nonliving Environment</i> 13-16</p>