



# Physical Science with Earth Science

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STANDARDS	PAGE REFERENCES
<b>A1—Science as Inquiry and Process</b>	
<p><b>SA Students develop an understanding of the processes and applications of scientific inquiry.</b></p> <p><b>SA1 Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments.</b></p> <p><b>SA2 Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.</b></p> <p><b>SA3 Students develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and local applications provide opportunity for understanding scientific concepts and global issues.</b></p>	
<b>The student develops an understanding of the processes of science by:</b>	
<p>[9] SA1.1 asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring and communicating. *</p>	<p><b>Student Edition:</b> 14-21, 22-26 <i>Launch Lab</i> 5 <i>Design Your Own Lab</i> 28-29 <i>Lab</i> 175, 208-209, 310-311, 380-381, 775 <i>Model and Invent Lab</i> 710-711</p> <p><b>Teacher Wraparound Edition:</b> IL 236, 274, 464; TTT 4F</p>

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<p>[9] SA1.2 hypothesizing, designing a controlled experiment, making qualitative and quantitative observations, interpreting data, and using this information to communicate conclusions.</p>	<p><b>Student Edition:</b> 7-10 <i>Design Your Own Lab</i> 28-29, 88-89, 144-145, 242-243, 540-541, 568-569</p> <p><b>Teacher Wraparound Edition:</b> A 13, 743; ACT 9; AIL 541, 742; IL 109; R 13</p>
<p><b>The student will demonstrate an understanding of the attitudes and approaches to scientific inquiry by:</b></p>	
<p>[9] SA2.1 formulating conclusions that are logical and supported by evidence.</p>	<p><b>Student Edition:</b> <i>Lab</i> 51, 196, 230, 379, 468, 523, 636-637, 741, 742-743, 830 <i>Model and Invent Lab</i> 176-177 <i>Design Your Own Lab</i> 344-345 <i>Use the Internet Lab</i> 476-477, 508-509</p>
<p><b>B1—Concepts of Physical Science</b></p>	
<p><b>SB Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.</b></p> <p><b>SB1 Students develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior.</b></p> <p><b>SB2 Students develop an understanding that energy appears in different forms, can be transformed from one form to another, can be transferred or moved from one place or system to another, may be unavailable for use, and is ultimately conserved.</b></p> <p><b>SB3 Students develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems.</b></p> <p><b>SB4 Students develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.</b></p>	
<p><b>The student demonstrates an understanding of the structure and properties of matter by:</b></p>	
<p>[9] SB1.1 describing atoms and their base components (i.e., protons, neutrons, electrons).</p>	<p><b>Student Edition:</b> 576-583, 584-587 <i>MiniLAB</i> 581 <i>National Geographic</i> 582</p> <p><b>Teacher Wraparound Edition:</b> A 581, 583; ACT 582; CFU 583, 587; D 585; DI 585; PR 583; QD 585; V 582</p>

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<b>The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by:</b>	
<p>[9] SB2.1 applying the concepts of heat transfer (i.e., conduction, convection, radiation) to Alaskan dwellings.</p>	<p><b>Student Edition:</b> 266-270, 272-273 <i>National Geographic</i> 268 <i>Lab</i> 271, 278-279</p> <p><b>Teacher Wraparound Edition:</b> A 270; AIL 278; QD 268; R 270; SCB 252E-F, 516E</p> <p>*Note: These references are non-specific to any particular state/dwelling.</p>
<p>[9] SB2.2 recognizing simple electrical circuits.</p>	<p><b>Student Edition:</b> 400-405, 407-413, 419 #20 <i>Launch Lab</i> 391 <i>MiniLAB</i> 402 <i>Design Your Own Lab</i> 414-415</p> <p><b>Teacher Wraparound Edition:</b> A 405, 413; ACT 403, 409; CFU 405; IM 390F; LD 408</p>
<b>The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by:</b>	
<p>[9] SB3.1 recognizing that a chemical reaction has taken place.</p>	<p><b>Student Edition:</b> 563-567, 720-725, 730-733, 734-740 <i>Integrate Earth Science</i> 565 <i>Applying Math</i> 566 <i>Science Online</i> 566 <i>Design Your Own Lab</i> 568-569</p> <p><b>Teacher Wraparound Edition:</b> AIL 568; CFU 567; IL 564; QD 561, 565; SCB 126F; SJ 564</p>
<p>[9] SB3.2 explaining that in chemical and nuclear reactions, energy (e.g., heat, light, mechanical, and electrical) is transferred into and out of a system.</p>	<p><b>Student Edition:</b> 128-133, 135-143, 151 #10, 486, 494-500, 801-806 <i>Integrate Environment</i> 139 <i>MiniLAB</i> 140</p> <p><b>Teacher Wraparound Edition:</b> QD 136; VL 136</p>
<p>[9] SB3.3 recognizing that atoms emit and absorb electromagnetic radiation.</p>	<p><b>Student Edition:</b> 269, 339-343, 459-461</p> <p><b>Teacher Wraparound Edition:</b> A 343; D 340; IM 269; PR 270; SJ 459; TPK 339</p>

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<p><b>The student demonstrates an understanding of motions, forces, their characteristics, relationships, and effects by:</b></p>	
<p>[9] SB4.1 explaining the relationship of motion to an object’s mass, and the applied force.</p>	<p><b>Student Edition:</b> 98-103 <i>Lab 87, 118-119</i> <i>Launch Lab 97</i> <i>Applying Math 102, 116</i></p> <p><b>Teacher Wraparound Edition:</b> QD 102; SCB 96F; V 115; VL 109</p>
<p>[9] SB4.2 recognizing that the gravitational attraction between objects is proportional to their masses and decreasing with their distance.</p>	<p><b>Student Edition:</b> 104-111 <i>Science Online 105</i> <i>Science and History 120</i></p> <p><b>Teacher Wraparound Edition:</b> FF 105; SCB 96E; TFYI 107</p>
<p>[9] SB4.3 describing the interactions of waves (i.e., reflection, refraction, wave addition).</p>	<p><b>Student Edition:</b> 301-309, 327-330 <i>Lab 338</i></p> <p><b>Teacher Wraparound Edition:</b> A 309; ACT 302; CC 305; CFU 309; DI 303; MM 304; IL 306; QD 304, 307; SJ 302; TFYI 303; UAA 302</p>
<p><b>D1—Concepts of Earth Science</b></p>	
<p><b>SD Students develop an understanding of the concepts, processes, theories, models, evidence, and systems of earth and space sciences.</b></p> <p><b>SD1 Students develop an understanding of Earth’s geochemical cycles.</b></p> <p><b>SD2 Students develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth.</b></p> <p><b>SD3 Students develop an understanding of the cyclical changes controlled by energy from the sun and by Earth’s position and motion in our solar system.</b></p> <p><b>SD4 Students develop an understanding of the theories regarding the evolution of the universe.</b></p>	
<p><b>The student demonstrates an understanding of geochemical cycles by:</b></p>	
<p>[9] SD1.1 using a model to demonstrate the rock cycle. (L)</p>	<p><b>Student Edition:</b> 617-623, 624-629, 630-635 <i>MiniLAB 628</i></p> <p><b>Teacher Wraparound Edition:</b> LD 634; QD 625, 626; R 635; TTT 606F; UAA 619</p>

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[9] SD1.2 applying knowledge of the water cycle to explain changes in the Earth's surface. *	<b>Student Edition:</b> 522, 654-662, 663-668 <i>MiniLAB</i> 656 <i>Science Online</i> 658 <i>National Geographic</i> 666 <b>Teacher Wraparound Edition:</b> ACT 655; CFU 522; LD 659; PR 668; RS 665; SCB 644E; UAA 656; V 666
<b>The student demonstrates an understanding of the forces that shape Earth by:</b>	
[9] SD2.1 recognizing the dynamic interaction of erosion and deposition including human causes.	<b>Student Edition:</b> 654-662 <i>Integrate Earth Science</i> 542 <b>Teacher Wraparound Edition:</b> D 658; IL 659; SCB 644E; SJ 660; VL 655
[9] SD2.2 describing how the theory of plate tectonics explains the dynamic nature of its surface.	<b>Student Edition:</b> 354-361, 362-369, 373-378, 385 #18 <i>Science Online</i> 374 <i>Lab</i> 379 <b>Teacher Wraparound Edition:</b> A 379; CC 377; CFU 378; SCB 352E
<b>The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by:</b>	
[9] SD3.1 recognizing the effect of the moon and sun on tides.	<b>Student Edition:</b> 198-199 <i>Applying Math</i> 198 <i>Section Review</i> 207 <b>Teacher Wraparound Edition:</b> A 207; R 207; RS 198; TFYI 199
[9] SD3.2 explaining the phenomena of the aurora.	<b>Student Edition:</b> 188, 215 #12
<b>The student demonstrates an understanding of the theories regarding the origin and evolution of the universe by:</b>	
[9] SD4.1 recognizing that a star changes over time.	<b>Student Edition:</b> 823-829, 845 #22, 847 #17 <i>National Geographic</i> 826 <b>Teacher Wraparound Edition:</b> D 825; PR 828; RS 825; USW 825

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[9] SD4.2 <u>explaining</u> that the position of stars changes in the expanding universe.	<b>Student Edition:</b> 836-839 <i>Model and Invent Lab</i> 836-837 <b>Teacher Wraparound Edition:</b> A 839; ACT 838; QD 838
[9] SD4.4 identifying the Big Bang Theory.	<b>Student Edition:</b> 837 <i>Section Review</i> 839
<b>E1—Science and Technology</b>	
<p><b>SE</b> Students develop an understanding of the relationships among science, technology, and society.</p> <p><b>SE1</b> Students develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events.</p> <p><b>SE2</b> Students develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that lead to the exploration of multiple paths that are analyzed using scientific, technological, and social merits.</p> <p><b>SE3</b> Students develop an understanding of how scientific discoveries and technological innovations affect and are affected by our lives and cultures.</p>	
<p><b>The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by:</b></p>	
[9] SE1.1 recognizing that the value of any given technology may be different for different groups of people and at different points in time (e.g., different uses of snow machines in different regions of Alaska).	<b>Student Edition:</b> 42-45, 63 #19, 65 #10 <i>Applying Science</i> 49 <b>Teacher Wraparound Edition:</b> DI 44
<p><b>The student demonstrates an understanding that solving problems involves different ways of thinking by:</b></p>	
[9] SE2.1 <u>questioning, researching, modeling, simulating,</u> and testing a solution to a problem. (L)	<b>Student Edition:</b> 11, 52-57 <i>Model and Invent Lab</i> 58-59, 176-177 <i>Design Your Own Lab</i> 344-345 <b>Teacher Wraparound Edition:</b> A 243; DI 169; IL 54, 274; QD 55; UP 67, 389

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<p><b>The student demonstrates an understanding of how scientific discoveries and technological innovations affect our lives and society by:</b></p>	
<p>[9] SE3.1 predicting <u>and evaluating</u> the possible effects of a recent scientific discovery, invention, or scientific breakthrough. (L)</p>	<p><b>Student Edition:</b> 45 <i>Science Online</i> 45 <i>MiniLAB</i> 47 <i>Science and Society</i> 178 <b>Teacher Wraparound Edition:</b> A 45; ACT 48; D 178; PR 50</p>
<p><b>F1—Cultural, Social, Personal Perspectives, and Science</b></p>	
<p><b>SF</b> Students develop an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives.</p> <p><b>SF1</b> Students develop an understanding of the interrelationships among individuals, cultures, societies, science, and technology.</p> <p><b>SF2</b> Students develop an understanding that some individuals, cultures, and societies use other beliefs and methods in addition to scientific methods to describe and understand the world.</p> <p><b>SF3</b> Students develop an understanding of the importance of recording and validating cultural knowledge.</p>	
<p><b>The student demonstrates an understanding of the dynamic relationships among scientific, cultural, social, and personal perspectives by:</b></p>	
<p>[9] SF1.1-SF3.1 describing the scientific principles involved in a subsistence activity (e.g., hunting, fishing, gardening). (L), Cross referenced with SA3.1, grade 8</p>	<p><b>Teacher Wraparound Edition:</b> CC 39; CD 8</p>

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<b>G1—History and Nature of Science</b>	
<p><b>SG</b> Students develop an understanding of the history and nature of science.</p> <p><b>SG1</b> Students develop an understanding that historical perspectives of scientific explanations demonstrate that scientific knowledge changes over time, building on prior knowledge.</p> <p><b>SG2</b> Students develop an understanding that the advancement of scientific knowledge embraces innovation and requires empirical evidence, repeatable investigations, logical arguments, and critical review in striving for the best possible explanations of the natural world.</p> <p><b>SG3</b> Students develop an understanding that scientific knowledge is ongoing and subject to change as new evidence becomes available through experimental and/or observational confirmation(s).</p> <p><b>SG4</b> Students develop an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base.</p>	
<p><b>The student demonstrates an understanding of changes in historical perspectives of science by:</b></p>	
<p>[9] SG1.1 identifying those perspectives (i.e., cultural, political, religious, philosophical) that have impacted the advancement of science.</p>	<p><b>Student Edition:</b> 38-45, 46-50, 218-219 <i>Science and Society</i> 510</p> <p><b>Teacher Wraparound Edition:</b> C 478; CB 210; D 210; HS 810; SCB 36E; SJ 802; TFYI 53</p>
<p><b>Students demonstrate an understanding of the bases of the advancement of scientific knowledge by:</b></p>	
<p>[9] SG2.1 explaining the importance of innovations (i.e., microscope, immunization, computer).</p>	<p><b>Student Edition:</b> 38-45, 469-475 <i>Integrate Earth Science</i> 11 <i>National Geographic</i> 44 <i>Science and History</i> 120, 312, 449 <i>Science Online</i> 172, 227 <i>Science and Society</i> 178 <i>Integrate History</i> 273</p> <p><b>Teacher Wraparound Edition:</b> HS 120, 312; VL 41, 55</p>
<p><b>The student demonstrates an understanding that scientific knowledge is ongoing and subject to change by:</b></p>	
<p>[9] SG3.1 describing the role of serendipity in scientific discoveries.</p>	<p><b>Student Edition:</b> <i>Accidents in Science</i> 60, 210, 712, 744</p> <p><b>Teacher Wraparound Edition:</b> ATE 60, 712; CC 137; D 744</p>