



Earth Science

Geology, the Environment, and the Universe

© 2008

STANDARDS	PAGE REFERENCES
<p>High School</p> <p>It is essential that these standards be addressed in contexts that promote scientific inquiry, use of evidence, critical thinking, making connections, and communication.</p>	
<p>H.1 <u>Structure and Function</u>: A system's characteristics, form, and function are attributed to the quantity, type, and nature of its components.</p>	
<p>H.1.P.1 Explain how atomic structure is related to the properties of elements and their position in the Periodic Table. Explain how the composition of the nucleus is related to isotopes and radioactivity.</p>	<p>Student Edition: 60-65, 601-603 <i>MiniLab</i> 62 <i>Math in Earth Science</i> 65 <i>Writing in Earth Science</i> 81</p> <p>Teacher Wraparound Edition: A 65; AES 61; CON 64; DIS 64; E 70; IM 63; ITI 61; M 64; R 65; TCS 63, 67</p>
<p>H.1.P.2 Describe how different types and strengths of bonds affect the physical and chemical properties of compounds.</p>	<p>Student Edition: 66-72 <i>National Geographic</i> 69 <i>Problem-Solving Lab</i> 70</p> <p>Teacher Wraparound Edition: A 72; CFU 72; CON 69; D 69; DIS 69; ESJ 71; MI 66</p>

STANDARDS		PAGE REFERENCES
H.1L.1	Compare and contrast the four types of organic macromolecules. Explain how they compose the cellular structures of organisms and are involved in critical cellular processes.	Student Edition: 688 Teacher Wraparound Edition: TCS 687
H.1L.2	Describe the chemical structure of DNA and its relationship to chromosomes. Explain the role of DNA in protein synthesis.	Student Edition: 635
H.1L.3	Explain and apply laws of heredity and their relationship to the structure and function of DNA.	This life standard falls outside the scope of this text.
H.1L.4	Explain how cellular processes and cellular differentiation are regulated both internally and externally in response to the environments in which they exist.	This life standard falls outside the scope of this text.
H.1E.1	Classify the bodies in our solar system based on properties and composition. Describe attributes of our galaxy and evidence for multiple galaxies in the universe.	Student Edition: 804-810, 811-815, 816-819, 862-868, 869-877 Teacher Wraparound Edition: A 868; CFU 810, 815; CL 804; D 864; ESJ 801, 806, 811; P 799; R 810; RE 865; TCS 872
H.1E.2	Describe the structure and composition of Earth's atmosphere, geosphere, and hydrosphere.	Student Edition: 8, 224-231, 238-241, 252-258, 282-288, 413-420, 486-488, 536-538 <i>Launch Lab</i> 251, 405 <i>National Geographic</i> 285 <i>MiniLab</i> 416 Teacher Wraparound Edition: AC 238; CFU 9; CL 8, 414; DI 252, 536; DIS 282; M 8; MI 282; TCS 282, 283
H.2 <u>Interaction and Change:</u> The components in a system can interact in dynamic ways that may result in change. In systems, changes occur with a flow of energy and/or transfer of matter.		
H.2P.1	Explain how chemical reactions result from the making and breaking of bonds in a process that absorbs or releases energy. Explain how the rate of a chemical reaction is affected by temperature, pressure, and concentration.	Student Edition: 70, 166-170, 188 #30, 259-260 Teacher Wraparound Edition: AC 166; CFU 170; CL 261; EC 71; ESJ 168; IM 260; TCS 70

STANDARDS	PAGE REFERENCES
<p>H.2P.2 Explain how physical and chemical changes demonstrate the law of conservation of mass.</p>	<p>Student Edition: 70, 75, 688 <i>National Geographic</i> 689 Teacher Wraparound Edition: AC 629; IM 689</p>
<p>H.2P.3 Describe the interactions of energy and matter including the law of conservation of energy.</p>	<p>Student Edition: 75, 688 (energy is mentioned in the context of photosynthesis and burning fossil fuels) Teacher Wraparound Edition: IM 689</p>
<p>H.2P.4 Apply the laws of motion and gravitation to describe the interaction of forces acting on an object and the resultant motion.</p>	<p>Student Edition: 14, 194, 233, 423-424, 796-803, 867-868 <i>Math in Earth Science</i> 803 Teacher Wraparound Edition: A 803; AC 797; CFU 803; DIS 798; IM 14, 770; MI 796; TCS 195, 425</p>
<p>H.2L.1 Explain how energy and chemical elements pass through systems. Describe how chemical elements are combined and recombined in different ways as they cycle through the various levels of organization in biological systems.</p>	<p>Student Edition: 224, 303, 628-630, 688 <i>Writing in Earth Science</i> 303 <i>National Geographic</i> 689 Teacher Wraparound Edition: AC 286, 629; IM 224; M 689; R 303; TCS 687; TPK 225, 413</p>
<p>H.2L.2 Explain how ecosystems change in response to disturbances and interactions. Analyze the relationships among biotic and abiotic factors in ecosystems.</p>	<p>Student Edition: 167, 238-241, 682-683, 687-692, 737-741, 742-747 <i>Earth Science & Society</i> 396 Teacher Wraparound Edition: AC 238, 740; DI 734; EC 167, 696, 738; ESJ 746; ITI 417; P 747</p>
<p>H.2L.3 Describe how asexual and sexual reproduction affect genetic diversity.</p>	<p>This life standard falls outside the scope of this text.</p>
<p>H.2L.4 Explain how biological evolution is the consequence of the interactions of genetic variation, reproduction and inheritance, natural selection, and time.</p>	<p>Student Edition: 606, 633-637, 652-654, 658-659, 665 <i>National Geographic Expeditions</i> 922-927 Teacher Wraparound Edition: A 659; RE 926; TCS 636</p>

STANDARDS	PAGE REFERENCES
<p>H.2L.5 Explain how multiple lines of scientific evidence support biological evolution.</p>	<p>Student Edition: 606-609 <i>Earth Science and Technology</i> 610 <i>GeoLab</i> 667 <i>National Geographic Expeditions</i> 666, 922-927 Teacher Wraparound Edition: A 637; ACT 923; E 658; ESJ 636; ITF 653; TCS 666, 924; TS 610</p>
<p>H.2E.1 Identify and predict the effect of energy sources, physical forces, and transfer processes that occur in the Earth system. Describe how matter and energy are cycled between system components over time.</p>	<p>Student Edition: 112, 224, 286-288, 303, 314-317, 688, 708 <i>Writing in Earth Science</i> 303 <i>MiniLab</i> 315 <i>National Geographic</i> 689 Teacher Wraparound Edition: A 288; AC 629; EC 716; M 689; MI 344, 355; R 303; TCS 286; TPK 225, 413; UAA 286</p>
<p>H.2E.2 Explain how Earth’s atmosphere, geosphere, and hydrosphere change over time and at varying rates. Explain techniques used to elucidate the history of events on Earth.</p>	<p>Student Edition: 408-409, 468-472, 595-600, 601-605, 606-609, 628-632, 648-652, 655-657, 660-664 <i>MiniLab</i> 597 <i>Problem-Solving Lab</i> 599 <i>GeoLab</i> 639 <i>Data Analysis Lab</i> 652 Teacher Wraparound Edition: CFU 632; DIS 656; ESJ 629; R 632; TCS 285, 629; TPK 628</p>
<p>H.2E.3 Describe how the universe, galaxies, stars, and planets evolve over time.</p>	<p>Student Edition: 796-803, 847-851, 867-868, 878-881 <i>Writing in Earth Science</i> 881 Teacher Wraparound Edition: AC 797; CFU 851; D 866; DI 848; DIS 867; IM 849, 850; R 868; TCS 866, 867; UAA 798</p>
<p>H.2E.4 Evaluate the impact of human activities on environmental quality and the sustainability of Earth systems. Describe how environmental factors influence resource management.</p>	<p>Student Edition: 678-681, 682-686, 693-697, 720-723, 734-736, 737-742, 742-747, 748-750 <i>Data Analysis Lab</i> 688 <i>Earth Science & Society</i> 698 Teacher Wraparound Edition: CFU 697; EC 679, 735; ESJ 696; ITP 679; M 683; P 696</p>

STANDARDS	PAGE REFERENCES
<p>H.3 Scientific Inquiry: Scientific inquiry is the investigation of the natural world by a systematic process that includes proposing a testable question or hypothesis and developing procedures for questioning, collecting, analyzing, and interpreting multiple forms of accurate and relevant data to produce justifiable evidence-based explanations and new explorations.</p>	
<p>H.3S.1 Based on observations and science principles formulate a question or hypothesis that can be investigated through the collection and analysis of relevant information.</p>	<p>Student Edition: 10-13, 423 #33 <i>National Geographic</i> 11 <i>MiniLab</i> 12 <i>GeoLab</i> 77, 103, 153, 185, 243, 305, 397, 667, 725, 853, 883 Teacher Wraparound Edition: P 11</p>
<p>H.3S.2 Design and conduct a controlled experiment, field study, or other investigation to make systematic observations about the natural world, including the collection of sufficient and appropriate data.</p>	<p>Student Edition: 10-13, 24 #33, 53 #38 <i>National Geographic</i> 11 <i>MiniLab</i> 12, 92, 143 <i>GeoLab</i> 77, 103, 125, 305, 397, 725 <i>Inquiry Extension</i> 185, 243 Teacher Wraparound Edition: P 11, 137; UAA 11</p>
<p>H.3S.3 Analyze data and identify uncertainties. Draw a valid conclusion, explain how it is supported by the evidence, and communicate the findings of a scientific investigation.</p>	<p>Student Edition: 10-13, 941-945 <i>National Geographic</i> 11 <i>MiniLab</i> 12, 92, 295, 843 <i>GeoLab</i> 77, 103, 153, 185, 305, 397, 519, 611, 667, 725, 853, 883</p>
<p>H.3S.4 Identify examples from the history of science that illustrate modification of scientific knowledge in light of challenges to prevailing explanations.</p>	<p>Student Edition: 18-19, 468-472, 473-479, 480-485, 486-488, 494 #36, 595, 633-637, 774, 796-803, 869-877, 878-881 <i>National Geographic Expeditions</i> 922-927 Teacher Wraparound Edition: AC 6, 635; DI 878; E 595; R 881; TCS 64, 802</p>

STANDARDS	PAGE REFERENCES
<p>H.3S.5 Explain how technological problems and advances create a demand for new scientific knowledge and how new knowledge enables the creation of new technologies.</p>	<p>Student Edition: 41-46, 406-407, 764-769 <i>Earth Science and Technology</i> 124, 610, 638, 820 <i>National Geographic</i> 455 <i>Reading for Comprehension</i> 673 <i>Launch Lab</i> 795</p> <p>Teacher Wraparound Edition: ACT 44; CL 42; CON 42; DI 42; DIS 211; TCS 4, 8</p>
<p>H.4 <u>Engineering Design:</u> Engineering design is a process of formulating problem statements, identifying criteria and constraints, proposing and testing possible solutions, incorporating modifications based on test data, and communicating the recommendations.</p>	
<p>H.4D.1 Define a problem and specify criteria for a solution within specific constraints or limits based on science principles. Generate several possible solutions to a problem and use the concept of trade-offs to compare them in terms of criteria and constraints.</p>	<p>The following pages include references to engineering design tasks as well as finding and proposing solutions to some kind of problem.</p> <p>Student Edition: 247 #37, 557 #41 <i>GeoLab</i> 70-271, 519, 699, 725, 752-753</p> <p>Teacher Wraparound Edition: A 697; CFU 723; ESJ 683; M 716; R 268</p>
<p>H.4D.2 Create and test or otherwise analyze at least one of the more promising solutions. Collect and process relevant data. Incorporate modifications based on data from testing or other analysis.</p>	<p>The following pages include references to engineering design tasks as well as finding and proposing solutions to some kind of problem.</p> <p>Student Edition: 247 #37 <i>GeoLab</i> 270-271, 519, 699, 725, 752-753 <i>Apply Your Skill</i> 270</p> <p>Teacher Wraparound Edition: CFU 723; M 716</p>
<p>H.4D.3 Analyze data, identify uncertainties, and display data so that the implications for the solution being tested are clear.</p>	<p>The following pages include references to engineering design tasks as well as finding and proposing solutions to some kind of problem.</p> <p>Student Edition: <i>GeoLab</i> 270-271, 519, 699, 725, 752-753 <i>Apply Your Skill</i> 270</p> <p>Teacher Wraparound Edition: CFU 723; M 716</p>

STANDARDS	PAGE REFERENCES
<p>H.4D.4 Recommend a proposed solution, identify its strengths and weaknesses, and describe how it is better than alternative designs. Identify further engineering that might be done to refine the recommendations.</p>	<p>The following pages include references to engineering design tasks as well as finding and proposing solutions to some kind of problem.</p> <p>Student Edition: 247#37, 557#11; 757#33, 757 #35 <i>GeoLab</i> 270-271, 519, 699, 725, 752-753 <i>Apply Your Skill</i> 270</p> <p>Teacher Wraparound Edition: A 697; CFU 723; M 716</p>
<p>H.4D.5 Describe how new technologies enable new lines of scientific inquiry and are largely responsible for changes in how people live and work.</p>	<p>Student Edition: 9, 41-46, 324-328, 769 <i>Earth Science and Technology</i> 47, 76 <i>Reading for Comprehension</i> 191</p> <p>Teacher Wraparound Edition: CON 41; D 44; E 724; TCS 4, 43, 47, 184; TS 76; UAA 327</p>
<p>H.4D.6 Evaluate ways that ethics, public opinion, and government policy influence the work of engineers and scientists, and how the results of their work impact human society and the environment</p>	<p>Student Edition: <i>Earth Science & Society</i> 213, 242, 698 <i>National Geographic Expeditions</i> 892-897</p> <p>Teacher Wraparound Edition: AC 695; CL 718, 896; DIS 204; NGE 2; R 395; TPK 393</p>