



EARTH SCIENCE

*Geology, the Environment,
and the Universe*

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STANDARDS	PAGE REFERENCES
<p>Standard A: Science Connections</p>	
<p>By the end of grade twelve, students will:</p>	
<p>A.12.1 Apply the underlying themes of science to develop defensible visions of the future</p>	<p>Student Edition: 11-13 <i>Mapping GeoLab</i> 204-205 <i>Activity</i> 234 <i>GeoLab</i> 292-293</p> <p>Teacher Wraparound Edition: A 377, 825, 851; CL 193, 199; DI 376; ESJ 715</p> <p>Teacher Resources: <i>Chapter Assessment</i> 53-54, 101-102 <i>Exploring Environmental Problems</i> 13-16, 29-32 <i>GeoLab and MiniLab Worksheets</i> 32-34, 44-45 <i>Laboratory Manual</i> 141-144, 145-148 <i>Performance Assessment in Earth Science</i> 1-2, 9-10, 15-16</p>

STANDARDS	PAGE REFERENCES
<p>A.12.2 Show how conflicting assumptions about science themes lead to different opinions and decisions about evolution, health, population, longevity, education, and use of resources, and show how these opinions and decisions have diverse effects on an individual, a community, and a country, both now and in the future</p>	<p>Student Edition: 189-190, 231, 376-377 <i>Science & Technology</i> 324, 854 <i>Science in the News</i> 596 Teacher Wraparound Edition: CB 442C, 682C; CL 446; DI 376; R 377 Teacher Resources: <i>Performance Assessment in Earth Science</i> 25-26 <i>Performance Assessment in the Science Classroom</i> 35</p>
<p>A.12.3 Give examples that show how partial systems, models, and explanations are used to give quick and reasonable solutions that are accurate enough for basic needs</p>	<p>Student Edition: 17-19, 32-36 <i>Discovery Lab</i> 27 <i>GeoLab</i> 114-115 <i>Design Your Own GeoLab</i> 704-705, 798-799 Teacher Wraparound Edition: CB 98C; ITI 56; M 695 Teacher Resources: <i>Exploring Environmental Problems</i> 9-12 <i>GeoLab and MiniLab Worksheets</i> 20-22, 104-106, 116-118 <i>Laboratory Manual</i> 1-4 <i>Performance Assessment in Earth Science</i> 1-2, 11-12, 23-24 <i>Performance Assessment in the Science Classroom</i> 35 <i>Science Notebook</i> 19</p>
<p>A.12.4 Construct arguments that show how conflicting models and explanations of events can start with similar evidence</p>	<p>Student Edition: 376-377, 443-447, 592-593, 775-779 <i>MiniLab</i> 126 <i>GeoLab</i> 140-141 Teacher Wraparound Edition: CB 442C; CL 446; DI 376; R 779 Teacher Resources: <i>GeoLab and MiniLab Worksheets</i> 23, 25-26</p>

STANDARDS	PAGE REFERENCES
A.12.5 Show how the ideas and themes of science can be used to make real-life decisions about careers, work places, life-styles, and use of resources	<p>Student Edition: 317-321, 511-515 <i>Focus on Careers</i> 48, 148, 266, 438, 548, 742, 860</p> <p>Teacher Resources: <i>Chapter Assessment</i> 113-114 <i>Performance Assessment in Earth Science</i> 1-2, 9-10 <i>Performance Assessment in the Science Classroom</i> 35, 37-38, 40, 59-60</p>
A.12.6 Identify and, using evidence learned or discovered, replace inaccurate personal models and explanations of science-related events	<p>Teacher Wraparound Edition: IM 26D, 76D, 188, 210D, 274, 470D, 497, 662, 774D, 849</p>
A.12.7 Re-examine the evidence and reasoning that led to conclusions drawn from investigations, using the science themes	<p>Student Edition: <i>GeoLab</i> 70-71 <i>Design Your Own GeoLab</i> 92-93, 378-379, 676-677, 704-705, 798-799 <i>Problem-Solving Lab</i> 110</p> <p>Teacher Wraparound Edition: CFU 227</p> <p>Teacher Resources: <i>Exploring Environmental Problems</i> 1-4 <i>GeoLab and MiniLab Worksheets</i> 10-12, 15-18, 56-58, 100-102, 104-106, 116-118 <i>Performance Assessment in Earth Science</i> 1-2</p>
Standard B: Nature of Science	
By the end of grade twelve, students will:	
B.12.1 Show how cultures and individuals have contributed to the development of major ideas in the earth and space, life and environmental, and physical sciences	<p>Student Edition: 775-779 <i>National Geographic Expeditions</i> 892-897</p> <p>Teacher Wraparound Edition: CB 4C, 361, 384C; CD 30, 168, 226, 313, 893, 906</p> <p>Teacher Resources: <i>Performance Assessment in Earth Science</i> 30 <i>Science Notebook</i> 189-190 <i>Study Guide for Content Mastery</i> 105</p>

STANDARDS	PAGE REFERENCES
B.12.2 Identify the cultural conditions that are usually present during great periods of discovery, scientific development, and invention	<p>Student Edition: 385-387, 557</p> <p>Teacher Wraparound Edition: CB 682D; CD 287; EC 788</p>
B.12.3 Relate the major themes of science to human progress in understanding science and the world	<p>Student Edition: 99-100, 775-779, 849-851 <i>GeoDigest</i> 546-548</p> <p>Teacher Wraparound Edition: AC 54; CB 4C, 774C</p> <p>Teacher Resources: <i>Performance Assessment in Earth Science</i> 27</p>
B.12.4 Show how basic research and applied research contribute to new discoveries, inventions, and applications	<p>Student Edition: 10, 37-41, 312-316, 317-321, 747-752 <i>Science & Technology</i> 22, 72, 354 <i>Science & the Environment</i> 736</p> <p>Teacher Wraparound Edition: CB 40, 298C</p> <p>Teacher Resources: <i>Performance Assessment in Earth Science</i> 32</p>
B.12.5 Explain how science is based on assumptions about the natural world and themes that describe the natural world	<p>Student Edition: 5-9, 19, 69</p> <p>Teacher Wraparound Edition: AC 300, 794; CB 147, 152C, 249, 270C; CD 164; TPK 787</p> <p>Teacher Resources: <i>Chapter Assessment</i> 13-16 <i>Exploring Environmental Problems</i> 29-32 <i>Laboratory Manual</i> 17-19 <i>Science Notebook</i> 33-35</p>

STANDARDS	PAGE REFERENCES
Standard C: Science Inquiry	
By the end of grade twelve, students will:	
<p>C.12.1 When studying science content, ask questions suggested by current social issues, scientific literature, and observations* of phenomena, build hypotheses that might answer some of these questions, design possible investigations*, and describe results that might emerge from such investigations</p>	<p>Student Edition: <i>Design Your Own GeoLab</i> 92-93, 704-705 <i>GeoLab</i> 174-175, 292-293, 618-619, 676-677 <i>Internet GeoLab</i> 352-353 Teacher Wraparound Edition: A 71; P 13 Teacher Resources: <i>Exploring Environmental Problems</i> 1-4, 9-12 <i>GeoLab and MiniLab Worksheets</i> 15-18, 28-30, 44-45, 52-54, 92-94 <i>Laboratory Manual</i> 57-60 <i>Performance Assessment in Earth Science</i> 1-2, 9-10 <i>Performance Assessment in the Science Classroom</i> 35</p>
<p>C.12.2 Identify* issues from an area of science study, write questions that could be investigated*, review previous research on these questions, and design and conduct responsible and safe investigations to help answer the questions</p>	<p>Student Edition: <i>GeoLab</i> 70-71, 114-115, 174-175, 232-233, 618-619 <i>Design Your Own GeoLab</i> 92-93, 292-293, 378-379, 676-677, 704-705 <i>Mapping GeoLab</i> 734-735 Teacher Resources: <i>Chapter Assessment</i> 95-96 <i>Exploring Environmental Problems</i> 1-4, 5-8 <i>GeoLab and MiniLab Worksheets</i> 9-12, 20-22, 36-38, 56-58, 108-110 <i>Laboratory Manual</i> 49-52 <i>Performance Assessment in Earth Science</i> 1-2</p>
<p>C.12.3 Evaluate* the data collected during an investigation*, critique the data-collection procedures and results, and suggest ways to make any needed improvements</p>	<p>Student Edition: <i>Design Your Own GeoLab</i> 92-93, 676-677, 704-705, 798-799 Teacher Wraparound Edition: CFU 227; D 15 Teacher Resources: <i>Exploring Environmental Problems</i> 1-4, 5-8, 25-27 <i>GeoLab and MiniLab Worksheets</i> 15-18, 100-102, 104-106, 116-119 <i>Laboratory Manual</i> 1-4, 17-20, 101-104, 201-204</p>

STANDARDS	PAGE REFERENCES
<p>C.12.4 During investigations*, choose the best data-collection procedures and materials available, use them competently, and calculate the degree of precision of the resulting data</p>	<p>Student Edition: <i>GeoLab</i> 20-21, 70-71, 174-175, 406-407, 826-827 <i>Design Your Own GeoLab</i> 92-93, 378-379, 406-407, 676-677, 704-705, 798-799 <i>Problem-Solving Lab</i> 110</p> <p>Teacher Resources: <i>Exploring Environmental Problems</i> 1-4, 5-8, 9-12, 29-32 <i>GeoLab and MiniLab Worksheets</i> 2-4, 28-30, 60-62, 122-125 <i>Laboratory Manual</i> 17-20 <i>Performance Assessment in Earth Science</i> 1-2, 13-14</p>
<p>C.12.5 Use the explanations* and models* found in the earth and space, life and environmental, and physical sciences to develop likely explanations* for the results of their investigations*</p>	<p>Student Edition: <i>GeoLab</i> 70-71, 114-115, 140-141 <i>Discovery Lab</i> 121, 833 <i>MiniLab</i> 302, 348, 376, 587, 761</p> <p>Teacher Wraparound Edition: DI 67; M 276, 373</p> <p>Teacher Resources: <i>Exploring Environmental Problems</i> 9-12, 21-24 <i>GeoLab and MiniLab Worksheets</i> 47, 51, 55, 87, 111 <i>Laboratory Manual</i> 97-100 <i>Performance Assessment in Earth Science</i> 1-2, 11-12, 13-14</p>
<p>C.12.6 Present the results of investigations* to groups concerned with the issues, explaining* the meaning and implications of the results, and answering questions in terms the audience can understand</p>	<p>Student Edition: <i>Activity</i> 176 <i>Internet GeoLab</i> 352-353, 488-489, 642-643, 852-853</p> <p>Teacher Wraparound Edition: CL 289</p> <p>Teacher Resources: <i>GeoLab and MiniLab Worksheets</i> 52-54, 72-74, 96-98, 128-130 <i>Laboratory Manual</i> 149-152 <i>Performance Assessment in Earth Science</i> 9-10, 19-20 <i>Performance Assessment in the Science Classroom</i> 63</p>

STANDARDS	PAGE REFERENCES
C.12.7 Evaluate* articles and reports in the popular press, in scientific journals, on television, and on the Internet, using criteria related to accuracy, degree of error, sampling, treatment of data, and other standards of experimental design	Teacher Wraparound Edition: DI 13; TPK 11 Teacher Resources: <i>Performance Assessment in Earth Science 15-16</i>
Standard E: Earth and Space Science	
By the end of grade twelve, students will:	
ENERGY IN THE EARTH SYSTEM	
E. 12.1 Using the science themes*, distinguish between internal energies* (decay of radioactive isotopes, gravity) and external energies (sun) in the earth's systems and show* how these sources of energy have an impact on those systems	Student Edition: 275-277, 578-579 Teacher Wraparound Edition: CB 578; M 276; R 579 Teacher Resources: <i>Science Notebook 256</i>
GEOCHEMICAL CYCLES	
E.12.2 Analyze* the geochemical and physical cycles of the earth and use them to describe* movements of matter	Student Edition: 138-139, 153-161, 184-188, 290-291, 664-665 <i>GeoLab 140-141, 174-175</i> <i>MiniLab 290</i> Teacher Wraparound Edition: A 139; AC 720; CB 270C; R 291 Teacher Resources: <i>Chapter Assessment 25-30, 31-36</i> <i>Exploring Environmental Problems 9-12, 33-36</i> <i>GeoLab and MiniLab Worksheets 24-26, 28-30, 43</i> <i>Laboratory Manual 37-40, 41-44</i> <i>Performance Assessment in Earth Science 8, 11-12</i> <i>Science Notebook 45-52, 53-64</i> <i>Study Guide for Content Mastery 27-32, 33-38</i>

STANDARDS	PAGE REFERENCES
THE ORIGIN AND EVOLUTION OF THE EARTH SYSTEM	
<p>E.12.3 Using the science themes*, describe* theories of the origins and evolution* of the universe and solar system, including the earth system* as a part of the solar system, and relate* these theories and their implications to geologic time on earth</p>	<p>Student Edition: 577-579, 793-797, 847-851 <i>Science & Technology</i> 854</p> <p>Teacher Wraparound Edition: A 579; CB 576C; CFU 797; ITI 795; R 797</p> <p>Teacher Resources: <i>Performance Assessment in Earth Science</i> 32 <i>Science Notebook</i> 255, 356-357, 374, 378-380 <i>Study Guide for Content Mastery</i> 179, 187, 199-200</p>
<p>E.12.4 Analyze* the benefits, costs, and limitations of past, present, and projected use of resources and technology and explain* the consequences to the environment</p>	<p>Student Edition: 254-257, 655-658, 659-663, 664-668, 669-675, 716-723, 724-729, 730-733 <i>Science & the Environment</i> 234, 260 <i>Mapping GeoLab</i> 258-259 <i>Science in the News</i> 294</p> <p>Teacher Wraparound Edition: ESJ 256</p> <p>Teacher Resources: <i>Chapter Assessment</i> 149-150, 161-162 <i>Exploring Environmental Problems</i> 33-36, 61-64 <i>GeoLab and MiniLab Worksheets</i> 40-42 <i>Performance Assessment in Earth Science</i> 9-10 <i>Science Notebook</i> 98, 301-302, 324-325</p>
THE ORIGIN AND EVOLUTION OF THE UNIVERSE	
<p>E.12.5 Using the science themes*, understand* that the origin of the universe is not completely understood, but that there are current ideas in science that attempt to explain its origin</p>	<p>Student Edition: 847-851</p> <p>Teacher Wraparound Edition: A 851; DIS 848, 851; R 851</p> <p>Teacher Resources: <i>Performance Assessment in Earth Science</i> 32</p>

STANDARDS	PAGE REFERENCES
Standard G: Science Applications	
By the end of grade twelve, students will:	
<p>G.12.1 Identify personal interests in science and technology, implications that these interests might have for future education, and decisions to be considered</p>	<p>Student Edition: 5-7 <i>Focus on Careers</i> 48, 148, 266, 438, 548, 650, 860 Teacher Wraparound Edition: E 6; ESJ 266</p>
<p>G.12.2 Design, build, evaluate, and revise models and explanations related to the earth and space, life and environmental, and physical sciences</p>	<p>Student Edition: <i>MiniLab</i> 79, 616 <i>GeoLab</i> 114-115, 232-233 <i>Design Your Own GeoLab</i> 676-677, 704-705, 798-799 Teacher Wraparound Edition: CL 184; M 62, 692, 695 Teacher Resources: <i>Chapter Assessment</i> 41-42 <i>Exploring Environmental Problems</i> 1-4, 5-8, 9-12 <i>GeoLab and MiniLab Worksheets</i> 13, 20-22, 36-38, 91 <i>Performance Assessment in Earth Science</i> 11-12, 13-14, 23-24 <i>Performance Assessment in the Science Classroom</i> 35</p>
<p>G.12.3 Analyze the costs, benefits, or problems resulting from a scientific or technological innovation, including implications for the individual and the community</p>	<p>Student Edition: 10, 716-723, 752 <i>Science in the News</i> 142, 294 <i>Science & the Environment</i> 176, 260, 736 <i>Science & Technology</i> 324 Teacher Wraparound Edition: EC 750 Teacher Resources: <i>Chapter Assessment</i> 154 <i>Performance Assessment in Earth Science</i> 9-10 <i>Performance Assessment in the Science Classroom</i> 35</p>

STANDARDS	PAGE REFERENCES
G.12.4 Show how a major scientific or technological change has had an impact on work, leisure, or the home	<p>Student Edition: 10, 37-41, 312-316, 747-752 <i>Science & Technology</i> 22, 116, 466</p> <p>Teacher Wraparound Edition: CON 688</p>
G.12.5 Choose a specific problem in our society, identify alternative scientific or technological solutions to that problem and argue its merits	<p>Student Edition: 690-697, 698-703 <i>Activity</i> 234</p> <p>Teacher Wraparound Edition: AES 230; CFU 703; M 702</p> <p>Teacher Resources: <i>Chapter Assessment</i> 113-114, 154 <i>Performance Assessment in Earth Science</i> 9-10 <i>Performance Assessment in the Science Classroom</i> 35</p>
<p>Standard H: Science in Personal and Social Perspectives</p>	
<p>By the end of grade twelve, students will:</p>	
H.12.1 Using the science themes and knowledge of the earth and space, life and environmental, and physical sciences, analyze the costs, risks, benefits, and consequences of a proposal concerning resource management in the community and determine the potential impact of the proposal on life in the community and the region	<p>Student Edition: 659-663, 669-675, 683-689, 690-697, 716-723, 730-733 <i>Science & the Environment</i> 260, 706 <i>National Geographic Expeditions</i> 871-873</p> <p>Teacher Wraparound Edition: PO 873</p> <p>Teacher Resources: <i>Chapter Assessment</i> 149-150, 161-162 <i>Performance Assessment in Earth Science</i> 9-10</p>
H.12.2 Evaluate proposed policy recommendations (local, state, and/or national) in science and technology for validity, evidence, reasoning, and implications, both short and long-term	<p>Student Edition: <i>Activity</i> 176 <i>Science in the News</i> 294 <i>Science & Technology</i> 324</p> <p>Teacher Wraparound Edition: A 91, 733; CFU 733; E 720; P 514, 672</p> <p>Teacher Resources: <i>Chapter Assessment</i> 149-150, 161-162 <i>Exploring Environmental Problems</i> 8</p>

STANDARDS	PAGE REFERENCES
<p>H.12.3 Show how policy decisions in science depend on social values, ethics, beliefs, and time-frames as well as considerations of science and technology</p>	<p>Student Edition: <i>Science in the News</i> 142 <i>Science & the Environment</i> 176, 234, 706, 736 <i>Science & Technology</i> 324, 824 Teacher Wraparound Edition: TS 294 Teacher Resources: <i>Performance Assessment in the Science Classroom</i> 46-47</p>
<p>H.12.4 Advocate a solution or combination of solutions to a problem in science or technology</p>	<p>Student Edition: <i>Activity</i> 234 Teacher Wraparound Edition: CFU 703; DIS 701; EC 131; M 702; TS 234 Teacher Resources: <i>Chapter Assessment</i> 41-42 <i>Laboratory Manual</i> 101-104 <i>Performance Assessment in Earth Science</i> 9-10 <i>Performance Assessment in the Science Classroom</i> 35, 41</p>
<p>H.12.5 Investigate how current plans or proposals concerning resource management, scientific knowledge, or technological development will have an impact on the environment, ecology, and quality of life in a community or region</p>	<p>Student Edition: <i>Activity</i> 142, 518 <i>Science & the Environment</i> 234, 260, 736 <i>Science & Technology</i> 324 Teacher Resources: <i>Chapter Assessment</i> 149-150, 161-162 <i>Exploring Environmental Problems</i> 9-12 <i>Laboratory Manual</i> 65-68, 77-80 <i>Performance Assessment in Earth Science</i> 9-10</p>
<p>H.12.6 Evaluate data and sources of information when using scientific information to make decisions</p>	<p>Teacher Wraparound Edition: DI 656; TPK 11 Teacher Resources: <i>Chapter Assessment</i> 59-60 <i>Performance Assessment in Earth Science</i> 15-16</p>

STANDARDS	PAGE REFERENCES
<p>H.12.7 When making decisions, construct a plan that includes the use of current scientific knowledge and scientific reasoning</p>	<p>Student Edition: <i>Activity 354, 408</i></p> <p>Teacher Wraparound Edition: <i>A 190, 340, 346; CFU 703, 723; P 82</i></p> <p>Teacher Resources: <i>Chapter Assessment 149-150</i> <i>Laboratory Manual 65-68, 77-80</i> <i>Performance Assessment in Earth Science 1-2, 9-10</i> <i>Performance Assessment in the Science Classroom 44-45</i></p>