



Earth Science

Geology, the Environment, and the Universe

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STANDARDS	PAGE REFERENCES
<p align="center">STANDARD 5.1 Scientific Processes</p> <p align="center"><i>ALL STUDENTS WILL DEVELOP PROBLEM-SOLVING, DECISION-MAKING AND INQUIRY SKILLS, REFLECTED BY FORMULATING USABLE QUESTIONS AND HYPOTHESES, PLANNING EXPERIMENTS, CONDUCTING SYSTEMATIC OBSERVATIONS, INTERPRETING AND ANALYZING DATA, DRAWING CONCLUSIONS, AND COMMUNICATING RESULTS.</i></p>	
<p>Descriptive Statement: Students best learn science by doing science. Science is not merely a collection of facts and theories but a process, a way of thinking about and investigating the world in which we live. This standard addresses those skills that are used by scientists as they discover and explain the physical universe—skills that are an essential and ongoing part of learning science.</p>	
<p>Strands and Cumulative Progress Indicators By the end of Grade 12, students will:</p>	
<p>5.1.12 A. Habits of Mind</p>	
<p>1. When making decisions, evaluate conclusions, weigh evidence, and recognize that arguments may not have equal merit.</p>	<p>Student Edition: 10-13 <i>National Geographic</i> 11 <i>GeoLab</i> 21, 77, 103, 125, 153, 185, 397, 667 <i>MiniLab</i> 115 <i>Problem-Solving Lab</i> 122 <i>Launch Lab</i> 133 <i>Writing in Earth Science</i> 333 Teacher Wraparound Edition: UAA 11</p>

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2. Assess the risks and benefits associated with alternative solutions.	Student Edition: 25 #37, 714-719 <i>Writing in Earth Science</i> 213 Teacher Wraparound Edition: CL 718; DIS 718; EC 722; IM 358
3. Engage in collaboration, peer review, and accurate reporting of findings.	Student Edition: 17-19 <i>Writing in Earth Science</i> 103, 305, 518 <i>Share Your Data</i> 125, 153, 367, 519, 611 <i>Inquiry Extension</i> 883 Teacher Wraparound Edition: A 101; CL 302; ESJ 407; P 832
4. Explore cases that demonstrate the interdisciplinary nature of the scientific enterprise.	Student Edition: 6-9, 41-46, 81 #38, 143-144, 166-170, 175, 413-416 <i>Careers in Earth Science</i> 72 <i>Reading for Comprehension</i> 341 Teacher Wraparound Edition: AC 229, 238, 293; CON 41; EC 167; ESJ 364
5.1.12 B. Inquiry and Problem Solving	
1. Select and use appropriate instrumentation to design and conduct investigations.	Student Edition: <i>GeoLab</i> 21, 77, 103, 125, 185, 243, 305, 357, 429, 725
2. Show that experimental results can lead to new questions and further investigations.	Student Edition: 10-13 <i>Inquiry Extension</i> 21, 77, 185, 243 <i>Launch Lab</i> 163 <i>Apply Your Skill</i> 397 Teacher Wraparound Edition: A 12, 172, 210, 281, 313, 343, 394
5.1.12 C. Safety	
1. Understand, evaluate and practice safe procedures for conducting science investigations.	Student Edition: 13 <i>MiniLab</i> 12, 394, 505 <i>GeoLab</i> 21, 77, 103, 125, 305, 397, 490-491, 725 <i>Launch Lab</i> 499, 763 <i>Reference Handbook</i> 954-955

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<p>STANDARD 5.2 Science and Society ALL STUDENTS WILL DEVELOP AN UNDERSTANDING OF HOW PEOPLE OF VARIOUS CULTURES HAVE CONTRIBUTED TO THE ADVANCEMENT OF SCIENCE AND TECHNOLOGY, AND HOW MAJOR DISCOVERIES AND EVENTS HAVE ADVANCED SCIENCE AND TECHNOLOGY.</p>	
<p>Descriptive Statement: Science is a human endeavor involving successes and failures, trials and tribulations. Students should know that great numbers of people from many cultures have contributed to our understanding of science and that science has a rich and fascinating history. This standard encourages students to learn about the people and events that have shaped or revolutionized important scientific theories and concepts.</p>	
<p>Strands and Cumulative Progress Indicators By the end of Grade 12, students will:</p>	
<p>5.2.12 A. Cultural Contributions</p>	
<p>1. Recognize the role of the scientific community in responding to changing social and political conditions and how scientific and technological achievement effect historical events.</p>	<p>Student Edition: <i>National Geographic Expeditions</i> 20, 366 <i>Earth Science and Technology</i> 47, 184 <i>Reading for Comprehension</i> 191 <i>Earth Science & Society</i> 213, 242, 396, 552 <i>Earth Science and the Environment</i> 269, 304, 724 Teacher Wraparound Edition: AC 876; ITF 388</p>
<p>5.2.12 B. Historical Perspectives</p>	
<p>1. Examine the lives and contributions of important scientists who effected major breakthroughs in our understanding of the natural and designed world.</p>	<p>Student Edition: 114-117, 468-472, 595, 633-635, 799-803 Teacher Wraparound Edition: A 412; AC 6, 326, 478; ESJ 407; ITF 32, 298, 351, 450, 593</p>
<p>2. Discuss significant technological achievements in which science has played an important part as well as technological advances that have contributed directly to the advancement of scientific knowledge.</p>	<p>Student Edition: 41-46, 406-407, 473-479, 495 #39, 536-538, 764-769 <i>Reading for Comprehension</i> 341, 673 <i>National Geographic Expeditions</i> 455 <i>Earth Science and Technology</i> 610, 638 <i>Launch Lab</i> 795 Teacher Wraparound Edition: AC 327; CON 41; TCS 474</p>

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3. Describe the historical origin of important scientific developments such as atomic theory, genetics, and plate tectonics showing how scientific theories develop, are tested, and can be replaced or modified in light of new information and improved investigative techniques.	Student Edition: 19, 468-472, 473-479, 480-485, 486-488, 633-635, 796-803, 873-877, 878-881 Teacher Wraparound Edition: ESJ 471; M 470; TCS 468, 470, 474, 621
STANDARD 5.3 Mathematical Applications ALL STUDENTS WILL INTEGRATE MATHEMATICS AS A TOOL FOR PROBLEM-SOLVING IN SCIENCE, AND AS A MEANS OF EXPRESSING AND/OR MODELING SCIENTIFIC THEORIES.	
Descriptive Statement: Science cannot be practiced or learned without appreciation of the role of mathematics in discovering and expressing natural laws. This standard recognizes the need for students to fully integrate mathematics skills with their learning of science.	
Strands and Cumulative Progress Indicators By the end of Grade 12, students will:	
5.3.12 A. Numerical Operations Reinforce indicators from previous grade level.	
5.3.12 B. Geometry and Measurement	
1. When performing mathematical operations with measured quantities, express answers to reflect the degree of precision and accuracy of the input data.	Student Edition: 16 <i>GeoLab</i> 21, 153, 185, 305, 367, 699 <i>Launch Lab</i> 223, 251, 829 <i>MiniLab</i> 453 <i>Problem-Solving Lab</i> 807 Teacher Wraparound Edition: DI 800
5.3.12 C. Patterns and Algebra	
1. Apply mathematical models that describe physical phenomena to predict real world events.	Student Edition: <i>Problem-Solving Lab</i> 37, 807 <i>Math in Earth Science</i> 65, 144, 288, 296, 416, 453, 605, 665 <i>GeoLab</i> 153, 699 Teacher Wraparound Edition: AC 416; TCS 63

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5.3.12 D. Patterns and Algebra	
1. Construct and interpret graphs of data to represent inverse and non-linear relationships, and statistical distributions.	Student Edition: 18, 25 #39-#41, 83 #10-#12 <i>Data Analysis Lab</i> 18, 208, 722 <i>Math in Earth Science</i> 170 <i>Problem-Solving Lab</i> 227, 294 <i>GeoLab</i> 305, 397 <i>MiniLab</i> 394, 453
STANDARD 5.4 Nature and Process of Technology ALL STUDENTS WILL UNDERSTAND THE INTERRELATIONSHIPS BETWEEN SCIENCE AND TECHNOLOGY AND DEVELOP A CONCEPTUAL UNDERSTANDING OF THE NATURE AND PROCESS OF TECHNOLOGY.	
Descriptive Statement: This standard focuses on developing students' understanding of the interrelationship between science and technology. It introduces students to and expands their understanding of the nature of technology. In addition, it introduces and develops students' abilities with technological design including experiences in predicting, decision making, critical thinking, and problem solving.	
Strands and Cumulative Progress Indicators By the end of Grade 12, students will:	
5.4.12 A. Science and Technology	
1. Know that scientific inquiry is driven by the desire to understand the natural world and seeks to answer questions that may or may not directly influence humans, while technology is driven by the need to meet human needs and solve human problems.	Student Edition: 10-13 <i>Earth Science and Technology</i> 47, 76, 184 <i>National Geographic Expeditions</i> 102, 366 <i>Earth Science and the Environment</i> 124, 428 Teacher Wraparound Edition: BI 4; TCS 47
5.4.12 B. Nature of Technology	
1. Assess the impacts of introducing a new technology in terms of alternative solutions, costs, tradeoffs, risks, benefits and environmental impact.	Student Edition: 714-719, 737-742, 743-747 <i>Earth Science and Technology</i> 184 <i>Reading for Comprehension</i> 191, 435, 731 <i>Section Assessment</i> 719 <i>Earth Science and the Environment</i> 724 <i>GeoLab</i> 725 Teacher Wraparound Edition: AES 766; CL 718; DIS 718; EC 722; TCS 724

STANDARDS	PAGE REFERENCES
5.4.12 C. Technological Design	
1. Plan, develop, and implement a proposal to solve an authentic, technological problem.	Student Edition: <i>GeoLab</i> 725 Teacher Wraparound Edition: A 697; M 716
<p style="text-align: center;">STANDARD 5.8 Earth Science ALL STUDENTS WILL GAIN AN UNDERSTANDING OF THE STRUCTURE, DYNAMICS, AND GEOPHYSICAL SYSTEMS OF THE EARTH.</p>	
Descriptive Statement: The study of science should include a study of the planet Earth and its relationship to the rest of the universe. This standard describes what students should know about the composition of the Earth and the forces that shape it.	
Strands and Cumulative Progress Indicators By the end of Grade 12, students will:	
5.8.12 A. Earth's Properties and Materials	
1. Explain the interrelationship of the geosphere, hydrosphere, and the atmosphere.	Student Edition: 8-9, 299, 378-380, 388-389, 392, 425-426, 628-632 Teacher Wraparound Edition: A 392; AC 300; CFU 380; D 393; ITU 3; R 9
5.8.12 B. Atmosphere and Water	
1. Describe how weather (in the short term) and climate (in the long term) involve the transfer of energy in and out of the atmosphere.	Student Edition: 286-288, 289-296, 314-317, 376-380, 388 <i>Concepts in Motion</i> 288 <i>Launch Lab</i> 313 <i>MiniLab</i> 315 Teacher Wraparound Edition: A 288; ITI 378; TCS 280, 282, 286; TPK 289; UAA 299

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5.8.12 C. Processes that Shape the Earth	
<p>1. Use the theory of plate tectonics to explain the relationship among earthquakes, volcanoes, mid-ocean ridges, and deep-sea trenches.</p>	<p>Student Edition: 473-479, 480-485, 495 #42, 500-503, 544 <i>National Geographic</i> 478 <i>Concepts in Motion</i> 483 <i>Table 17.1</i> 483 <i>Earth Science and the Environment</i> 489 <i>Section Assessment</i> 544 <i>GeoLab</i> 553 Teacher Wraparound Edition: CFU 507; ITI 500, 501; TCS 502</p>
<p>2. Know that Earth is a system in which chemical elements exist in fixed amounts and move through the solid Earth, oceans, atmosphere, and living things as part of geochemical cycles.</p>	<p>Student Edition: 65, 224, 282-283, 303, 688 <i>Concepts in Motion</i> 415, 689 <i>National Geographic</i> 415, 689 Teacher Wraparound Edition: AC 629; IM 689; ITI 415; M 689; R 303; TCS 280</p>
<p>3. Recognize that the evolution of life on Earth has changed the composition of Earth's atmosphere through time.</p>	<p>Student Edition: 629-631, 643 #37, 687 <i>Section Assessment</i> 632 Teacher Wraparound Edition: ESJ 629; TCS 284, 629</p>
5.8.12 D. How We Study the Earth	
<p>1. Analyze the evidence produced by a variety of techniques that is used to understand changes in the Earth that have occurred over time.</p> <ul style="list-style-type: none"> ▶ topography ▶ fossils ▶ rock stratification ▶ ice cores ▶ radiometric data 	<p>Student Edition: 469-471, 590-594, 595-600, 601-605, 606-609 <i>MiniLab</i> 597 <i>Problem-Solving Lab</i> 599 Teacher Wraparound Edition: AC 6, 469; ACT 608; D 598; DI 596; M 598; R 600</p>

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STANDARD 5.9 Astronomy and Space Science ALL STUDENTS WILL GAIN AN UNDERSTANDING OF THE ORIGIN, EVOLUTION, AND STRUCTURE OF THE UNIVERSE	
Descriptive Statement: The study of science should include a study of the planet Earth and its relationship to the rest of the universe. This standard describes what students should know about astronomy and space science.	
Strands and Cumulative Progress Indicators By the end of Grade 12, students will:	
5.9.12 A. Earth, Moon, Sun System Reinforce indicators from previous grade levels.	
5.9.12 B. Solar System	
1. Explain that our solar system coalesced from a nebular cloud of gas and dust left from exploding stars.	Student Edition: 796-799, 848 <i>Concepts in Motion</i> 848 Teacher Wraparound Edition: AC 797; ITU 761; MI 796; TPK 797; UAA 798
5.9.12 C. Stars	
1. Describe the physical characteristics, stages of development, and the apparent motions of stars.	Student Edition: 830-836, 837-846, 847-851 <i>Concepts in Motion</i> 841 <i>MiniLab</i> 843 <i>GeoLab</i> 853 Teacher Wraparound Edition: A 846, 851; CFU 846; DI 848; DIS 844; R 846; TCS 831; TPK 838
5.9.12 D. Galaxies and Universe	
1. Describe data gathering and observation technologies and explain how they are used to explore the solar system and beyond.	Student Edition: 764-769, 770, 808-810, 811-815 <i>Concepts in Motion</i> 767 <i>Launch Lab</i> 795 <i>Earth Science and Technology</i> 820 <i>National Geographic Expeditions</i> 934-939 Teacher Wraparound Edition: A 769; AES 939; ESJ 766; TCS 809, 934

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<p>2. Cite evidence to describe the scientific theory of the origin of the universe and the current explanations of its evolution.</p>	<p>Student Edition: 873-877, 878-881 <i>MiniLab</i> 873 <i>Writing in Earth Science</i> 881</p> <p>Teacher Wraparound Edition: A 881; AC 326; CFU 881; DI 878, 880; ESJ 879; IM 879; MI 878; P 880; R 881</p>