Science Textbook Correlation Matrices
Earth Science Standards of Learning
Publisher: Glencoe/McGraw-Hill Text/Instructional Material Title: Glencoe Earth Science: Geology, the Environment, and the Universe ©2002

Science Standard	**Correlation By Page Numbers** Make all correlations using the teacher text. Identify only *significant* areas of correlation. Use each bullet of the standard in the context of the stem. Please consult the 2003 Science Curriculum Framework for further information about each standard.
ES.1 The student will plan and conduct investigations in which	
a) volume, area, mass, elapsed time, direction, temperature, pressure, distance, density, and changes in elevation/depth are calculated utilizing the most appropriate tools;	14–15, 20–21, 35, 42–43, 278, 292–293, 312–313
b) technologies, including computers, probeware, and global positioning systems (GPS) are used to collect, analyze, and report data and to demonstrate concepts and simulate experimental conditions;	40, 49, 352–353, 466, 488–489, 642–643, 852–853
c) scales, diagrams, maps, charts, graphs, tables, and profiles are constructed and interpreted;	This objective is addressed throughout. See for example: 18, 27, 42–43, 200, 258–259, 322–323, 352–353, 430–431, 464–465, 665, 747, 768–769, 852–853, 933–938
d) variables are manipulated with repeated trials; and	12, 48, 930–931
e) a scientific viewpoint is constructed and defended (the nature of science).	11–13, 48, 924–927, 928–932

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ES.2 The student will demonstrate scientific reasoning and logic by	
a) analyzing how science explains and predicts the interactions and dynamics of complex Earth systems;	176, 206, 234, 260, 324, 354, 380, 432, 490, 518, 620, 706, 736, 854
b) recognizing that evidence is required to evaluate hypotheses and explanations;	This objective is addressed throughout. See for example: 11–13, 20–21, 114–115, 140–141, 174–175, 232–233, 292–293, 378–379, 570–571, 618–619, 704–705, 826–827, 852–853
c) comparing different scientific explanations for the same observations about the Earth;	633–634, 775–776, 779, 847–851
d) explaining that observation and logic are essential for reaching a conclusion; and	This objective is addressed throughout. See for example: 108, 229, 348, 394, 474, 536, 587, 636, 688, 845
e) evaluating evidence for scientific theories.	633–634, 775–776, 779, 847–851

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ES.3 The student will investigate and understand how to read and interpret maps, globes, models, charts, and imagery. Key concepts include	
a) maps (bathymetric, geologic, topographic, and weather) and star charts;	32, 35, 42–43, 46–47, 49, 317–318, 322–323, 436–437, 464–465
b) imagery (aerial photography and satellite images);	37–41, 466
c) direction and distance measurements on any map or globe; and	27–31, 46–47, 49
d) location by latitude and longitude and topographic profiles.	27–31, 46–47, 49

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ES.4 The student will investigate and understand the characteristics of the Earth and the solar system. Key concepts include	
a) position of the Earth in the solar system;	783, 858–859
b) sun-Earth-moon relationships (seasons, tides, and eclipses);	370, 373, 400–403, 438, 759–760, 764, 765–767, 858
c) characteristics of the sun, planets, their moons, comets, meteors, and asteroids; and	387, 578–579, 753–757, 768–769, 780–785, 786–792, 795–797, 802–803, 805–812, 858–859
d) the history and contributions of the space program.	751–752, 775, 858

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ES.5 The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. Key concepts include	
a) properties including hardness, color and streak, luster, cleavage, fracture, and unique properties; and	84–89, 91, 92–93, 96–97, 146–147
b) uses of minerals.	89–90, 146–147

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ES.6 The student will investigate and understand how to identify common rock types based on mineral composition and textures and the rock cycle as it relates to the origin and transformation of rock types. Key concepts include	
a) igneous (intrusive and extrusive);	99–106, 107–113, 118–119, 138–139
b) sedimentary (clastic and chemical); and	121–127, 128–132, 138–139, 140–141, 144–145
c) metamorphic (foliated and unfoliated) rocks.	133–139, 140–141, 144–145

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ES.7 The student will investigate and understand the differences between renewable and nonrenewable resources. Key concepts include	
a) fossil fuels, minerals, rocks, water, and vegetation;	655–658, 659–663, 664–668, 669–675, 680–681, 686–689, 690–697, 740–742
b) advantages and disadvantages of various energy sources;	655–658, 690–697
c) resources found in Virginia;	The opportunity to address this objective is available. See the following: 655–658, 659–663, 664–668, 669–675, 680–681, 686–689, 690–697, 740–742
d) making informed judgments related to resource use and its effects on Earth systems; and	672–675, 698–703, 704–705, 711–715, 716–723, 724–729, 730–733, 740–742
e) environmental costs and benefits.	664–668, 690–697, 698–703, 711–715, 716–723, 724–729, 730–733, 740–742

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ES.8 The student will investigate and understand geologic processes including plate tectonics. Key concepts include	
a) how geologic processes are evidenced in the physiographic provinces of Virginia including the Coastal Plain, Piedmont, Blue Ridge, Valley and Ridge, and Appalachian Plateau;	532–534
b) processes (faulting, folding, volcanism, metamorphism, weathering, erosion, deposition, and sedimentation) and their resulting features; and	121–124, 133–135, 148, 153–161, 162–166, 174–175, 178–179, 191–197, 198–203, 223–224, 226, 413–415, 417–418, 421, 427–428, 480–487, 488–489, 497, 512–513, 538–539, 546–548
c) tectonic processes (subduction, rifting and sea floor spreading, and continental collision).	443–447, 448–454, 455–459, 460–463, 468–469, 528–531, 546–548

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ES.9 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. Key concepts include	
a) processes of soil development;	167–168, 264
b) development of karst topography;	246–247, 266
c) identification of groundwater zones including water table, zone of saturation, and zone of aeration;	241–242, 674
d) identification of other sources of fresh water including rivers, springs, and aquifers with reference to the hydrologic cycle;	211, 212, 214, 243, 249–254, 260, 265–266, 290–291, 436
e) dependence on freshwater resources and the effects of human usage on water quality; and	254–257, 265–266, 669–675
f) identification of the major watershed systems in Virginia including the Chesapeake Bay and its tributaries.	The opportunity to address this objective is available. See the following: 215

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ES.10 The student will investigate and understand that many aspects of the history and evolution of the Earth and life can be inferred by studying rocks and fossils. Key concepts include	
a) traces or remains of ancient, often extinct, life are preserved by various means in many sedimentary rocks;	566–569, 648
b) superposition, cross-cutting relationships, index fossils, and radioactive decay are methods of dating bodies of rock;	557–559, 562–563, 629, 648
c) absolute and relative dating have different applications but can be used together to determine the age of rocks and structures; and	557–561, 562–565, 648
d) rocks and fossils from many different geologic periods and epochs are found in Virginia.	The opportunity to address this objective is available. See the following: 553–556, 557–561, 562–565, 648

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ES.11 The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include	
a) physical and chemical changes (tides, waves, currents, sea level and ice cap variations, upwelling, and salinity concentrations);	388–389, 390, 392–395, 399–405, 406–407, 413–421, 430–431, 438
b) importance of environmental and geologic implications;	375–377, 392–395, 399–405, 413–421, 422–429, 430–431, 437–438
c) systems interactions (density differences, energy transfer, weather, and climate);	299–304, 305–311, 359–363, 364–368, 403, 436–437
d) features of the sea floor (continental margins, trenches, mid-ocean ridges, and abyssal plains) reflect tectonic processes; and	422–429, 438, 449, 453–454, 536
e) economic and public policy issues concerning the oceans and the coastal zone including the Chesapeake Bay.	The opportunity to address this objective is available. See the following: 375–377, 413–421

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ES.12 The student will investigate and understand the origin and evolution of the atmosphere and the interrelationship of geologic processes, biologic processes, and human activities on its composition and dynamics. Key concepts include	
a) scientific evidence for atmospheric changes over geologic time;	584–588, 648–649, 664
b) current theories related to the effects of early life on the chemical makeup of the atmosphere;	585–586, 648–649, 664, 740
c) comparison of the Earth's atmosphere to that of other planets;	271–277, 780–785, 786–792
d) atmospheric regulation mechanisms including the effects of density differences and energy transfer; and	275–277, 278–284
e) potential atmospheric compositional changes due to human, biologic, and geologic activity.	273, 294, 664–668, 740, 742

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ES.13 The student will investigate and understand that energy transfer between the sun, Earth, and the Earth's atmosphere drives weather and climate on Earth. Key concepts include	
a) observation and collection of weather data;	312–316, 352–353
b) prediction of weather patterns;	317–321, 322–323, 326–327, 352–353
c) severe weather occurrences such as tornadoes, hurricanes, and major storms; and	329–333, 334–340, 341–346, 347–351, 352–353, 356–357
d) weather phenomena and the factors that affect climate including radiation and convection.	275–277, 289–290, 299–304, 305–312, 326–327

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ES.14 The student will investigate and understand scientific concepts related to the origin and evolution of the universe. Key concepts include	
a) nebulae;	822, 823, 830–831
b) the origin of stars and star systems;	821–825
c) stellar evolution;	821–825, 830–831
d) galaxies; and	833–838, 839–846, 852–853, 856–857
e) cosmology (the Big Bang).	847–851, 856–857

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Additional Criteria	**Evidence** Please provide information that will assist the reviewers in identifying support for the following criterion indicators.
1. Safe use of materials and equipment is encouraged.	Safety is emphasized throughout the text in each Lab, ex. page 394 and in Appendix B-Safety in the Laboratory, pages 910-911. Three Safety Consultants reviewed the materials to assure that all safety requirements were met.

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2. Materials emphasize the use of effective instructional practices and learning theories. • Students are guided through different approaches such as the learning cycle . • Students are provided the opportunity to conduct scientific inquiry appropriate for their age, grade, and maturity. • Concepts are introduced through concrete experiences. • Students are required to use manipulative materials during investigations and activities. • Multiple opportunities are provided for students to apply concepts. • Learning activities offer opportunities for students to revise their prior knowledge and create new knowledge. • Students are encouraged to pose questions and to identify problems, as well as propose multiple solutions and design and conduct tests of inference. • Students collect and interpret data through a variety of technologies and draw conclusions based on that data.	• Both in Chapter 1, pages 4-25 and the Skills Handbook, pages 924-938 provide information on the Scientific Method, Critical Thinking methods and methods of organizing information. • The text is correlated with the National Science Content Standards, TWE pages 8T-9T, to assure the scientific inquiry included is appropriate for age, grade, and maturity. • These are included throughout the text. Specific examples are in Science and Technology, ex. page 466 Science and The Environment, ex. page 706, and MiniLabs, ex. page 587 • Students are required to use manipulative materials in GeoLabs, ex. page 676, MiniLabs, ex. page 108, Discovery Labs, ex. page 471. An equipment and materials list is included in the TWE, pages 44T-49T. • These are included throughout the text. Specific examples are the GeoLabs, ex. pages 92-93 and the end-of-chapter Assessments, ex. page 97. • Each chapter in the TWE includes Identifying Misconceptions, which contains Uncovering the Misconception and Assessing New Knowledge, ex. TWE page 33T • These are included throughout the text. Specific examples are included in the Skills Handbook, pages 924-938. • The various types of Labs provide evidence of this criteria. The Discovery Labs, GeoLabs, Design Your Own Labs, MiniLabs, Mapping GeoLabs and the Internet GeoLab are described in the TWE on page 12T..

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Additional Criteria	**Evidence** Please provide information that will assist the reviewers in identifying support for the following criterion indicators.
3. Materials present content in an accurate, unbiased manner, and are based on sound science. • Materials do not contain content errors (omissions of current content, out-of-date content, overgeneralizations, etc.). • Materials do not contain production errors (misspelled words, word omissions, incorrect answers). • Diverse groups (racial, ethnic, cultural, linguistic), males and females, people with disabilities, and people of all ages are represented appropriately. • The materials are free of non-scientific explanation.	• The material was reviewed by consultants, teachers and editors and found to be free of content errors. • Page proofs were thoroughly checked by the editors to correct production errors. • As a matter of policy, all photos were checked to assure that diverse groups, males and females, people with disabilities and people of all ages were represented appropriately. • The material was checked by consultants, teachers, and editors to assure that non-scientific explanation was not included.

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Additional Criteria	**Evidence** Please provide information that will assist the reviewers in identifying support for the following criterion indicators.
4. Materials promote student assessment as an integral part of the instructional process. • Assessment suggestions and scoring criteria for student performances on work such as lab practicals or tasks, concept maps, research projects, observation checklists, etc., are provided. • Assessment items include multiple-choice, short answer, essay and open-ended questions with charts, graphs, and diagrams imbedded within the items. • Options include techniques for assessing students' prior knowledge. • Assessment items reflect the rigor and the intent of the standards. For example, they require students to use higher order thinking skills to apply, analyze, synthesize, evaluate, and make judgments or recommendations.	• Assessment suggestions are included in Teaching Strategies. These are found in TWE pages 34T-37T. • These assessment items are in each chapter's Section Assessment, ex. page 36 and end-of-chapter Assessment, ex. pages 41-47. • Tying to Previous Knowledge is a feature found in the TWE, ex. page 11. • These are found throughout the text. Specific examples are the MiniLabs, ex. page 29, Section Assessments, ex. page 41. Mapping GeoLabs, ex. page 42 and end-of-chapter Assessment, ex. page 46.

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Additional Criteria	**Evidence** Please provide information that will assist the reviewers in identifying support for the following criterion indicators.
5. Materials are presented in an organized, logical manner and are appropriate for the age, grade, and maturity of the students. • Materials are organized appropriately within and among units of study. • Format design includes titles, subheadings, and appropriate cross-referencing for ease of use. • Writing style, length of sentences, and vocabulary are appropriate. • Graphics and illustrations are appropriate. • Level of abstraction is appropriate, and real life examples, including careers are provided. • Sufficient applications are provided to promote depth of understanding.	• Materials were reviewed by consultants, teachers and editors and found to be organized appropriately. • The design includes titles, subheadings and cross references, ex. page 128. • The writing style, length of sentences, and vocabulary were reviewed by consultants, teachers and editors and found to be appropriate. • The graphics and illustrations were reviewed by consultants, teachers and editors and found to be appropriate. • These are provided in the GeoLabs, Discovery Labs, Mapping GeoLabs, Science in the News, Science and Technology and Science in the Environment. Information on these are found in the TWE on pages 12T and 14T. • Besides the applications in the GeoLabs, Discovery Labs, Mapping GeoLabs and Section Assessments, each chapter includes Chapter Assessment with additional applications, ex. pages 46-47.