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(Grades 9-12)

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EALR 1: Systems (SYS)	
Core Content: Predictability and Feedback	
In prior grades, students learned how to simplify and analyze complex situations by thinking about them as systems. In grades 9-12, students learn to construct more sophisticated system models, including the concept of feedback. Students are expected to determine whether or not systems analysis will be helpful in a given situation and if so, to describe the system, including subsystems, boundaries, flows, and feedbacks. The next step is to use the system as a dynamic model to predict changes. Students are also expected to recognize that even the most sophisticated models may not accurately predict how the real world functions. This deep understanding of systems and ability to use systems analysis is an essential tool both for scientific inquiry and for technological design.	
Content Standards	
Students know that:	
9-12 SYSA - Feedback is a process in which the output of a system provides information used to regulate the operation of the system. Positive feedback increases the disturbance to a system. Negative feedback reduces the disturbance to a system.	**SE/TE:** 94-101, 102-107, 108-112, 113-116, 410-411; Inquiry Activity: 93; Application Lab: 118-119; Section Assessment: 4.1, 4.2, 4.3, 4.4 **Event-Based Science:** Representative Selections: **GOLD MEDAL!** 13-14 **BLACKOUT!** 14-15 **BLIGHT!** 35-36 **OIL SPILL!** 14 **EARTHQUAKE!** 25, 29, 34, 36-37 **GLOBAL WARMING!**: 9, 10-11, 45
	TR: 92C-92D; Teacher Demo: 96, 99, 105, 106, 111, 114; Build Science Skills: 96, 100, 103, 411; Laboratory Manual: Recovering Oil, Desalinization by Distillation; Guided Reading and Study Workbook: 4.1, 4.2, 4.3, 4.4; Chapter Test: 4; Virtual Lab Record Sheets: Lab 6, 7
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 19, 23, 24, 25; Discovery Channel Videos: PET Clothes; On-line Text: 4.1, 4.2, 4.3, 4.4; Teacher Express: 4.1, 4.2, 4.3, 4.4; Computer Test Bank: 4; Virtual Labs CD: Lab 6, 7

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9-12 SYSB - Systems thinking can be especially useful in analyzing complex situations. To be useful, a system needs to be specified as clearly as possible.	**SE/TE:** 66-69, 85, 113-116, 158-163, 164-170, 171-179, 218-221, 222-227, 231-232, 269, 308-311, 336-341, 448-453, 459, 460, 479-482, 534-536, 746-747, 750, 751; How the Earth Works: 148, 208, 238, 298, 438, 494, 578, 604; Inquiry Activity: 65, 157; Section Assessment: 3.1, 4.4, 6.1, 12.1, 16.1; Application Lab: 118-119; Exploration Lab: 150 **Event-Based Science:** Representative Selections: **OUTBREAK!** 46 **BLIGHT!** 18 **OIL SPILL!** 22-24 **TOXIC LEAK!** 17 **EARTHQUAKE!** 25, 29, 36
	TR: 64C-64D, 92C-92D, 124C-124D; Teacher Demo: 68, 114, 310, 339, 451, 481; Build Science Skills: 68, 159, 160, 309, 460, 479, 536; Laboratory Manual: Recovering Oil, Desalinization by Distillation, Rivers That Shape the Land, Modeling Cavern Formation; Guided Reading and Study Workbook: 3.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Chapter Test: 3, 4, 6, 11, 12, 16, 17; Virtual Lab Record Sheets: Lab 6, 7, 8, 13
	TECH: www.phschool.com; www.SciLinks.org; Discovery Video Field Trip: 64, 125, 216, 246, 278, 306, 362, 474, 502, 556, 586; Computer Test Bank: 3, 4, 6, 11, 12, 16, 17; Online Text: 3.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Teacher Express 1.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Transparencies: 37, 37; Virtual Lab CD: Lab 6, 7, 8, 13
9-12 SYSC - In complex systems, entirely new and unpredictable properties may emerge. Consequently, modeling a complex system in sufficient detail to make reliable predictions may not be possible.	**SE/TE:** 66-69, 85, 113-116, 158-163, 164-170, 171-179, 218-221, 222-227, 231-232, 269, 308-311, 336-341, 448-453, 459, 460, 479-482, 534-536, 746-747, 750, 751; How the Earth Works: 148, 208, 238, 298, 438, 494, 578, 604; Inquiry Activity: 65, 157; Section Assessment: 3.1, 4.4, 6.1, 12.1, 16.1; Application Lab: 118-119; Exploration Lab: 150 **Event-Based Science:** Representative Selections: **BLIGHT!** 35-36 **OIL SPILL!** 14, 39 **EARTHQUAKE!** 23, 25, 29, 34, 36-37 **FIRE!**: 54-55 **BLACKOUT!**: 4-6, 13

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	TR: 64C-64D, 92C-92D, 124C-124D; Teacher Demo: 68, 114, 310, 339, 451, 481; Build Science Skills: 68, 159, 160, 309, 460, 479, 536; Laboratory Manual: Recovering Oil, Desalinization by Distillation, Rivers That Shape the Land, Modeling Cavern Formation; Guided Reading and Study Workbook: 3.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Chapter Test: 3, 4, 6, 11, 12, 16, 17
	TECH: www.phschool.com; www.SciLinks.org; Discovery Video Field Trip: 64, 125, 216, 246, 278, 306, 362, 474, 502, 556, 586; Computer Test Bank: 3, 4, 6, 11, 12, 16, 17; Online Text: 3.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Teacher Express 1.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Transparencies: 37, 37
9-12 SYSD - Systems can be changing or in equilibrium.	**SE/TE:** 689-670; Section Assessment: 24.3 **Event-Based Science:** Representative Selections: **BLACKOUT!** 14-15, 22-23 **FIRST FLIGHT!** 8-9 **THRILL RIDE!** 21-22, 36-37 **BLIGHT!** 35-36 **EARTHQUAKE!** 25, 29, 34, 36-37
	TR: Reteach: 670; Chapter Test: 24; Virtual Lab Record Sheets: Lab 6, 7, 8
	TECH: www.phschool.com; www.SciLinks.org; On-line Text: 24.3; Teacher Express: 24.3; Computer Test Bank: 24; Virtual Lab CD: Lab 6, 7, 8
Performance Expectations	
Students are expected to:	
Give examples of a positive feedback system and explain its regulatory mechanism (e.g., global warming causes Earth's ice caps to melt, reflecting less energy to space, increasing temperatures). Give examples of a negative feedback system and explain its regulatory mechanism (e.g., when a human body overheats, it produces sweat that cools the body by evaporation).	**SE/TE:** 66-69, 85, 113-116, 158-163, 164-170, 171-179, 218-221, 222-227, 231-232, 269, 308-311, 336-341, 448-453, 459, 460, 479-482, 534-536, 746-747, 750, 751; How the Earth Works: 148, 208, 238, 298, 438, 494, 578, 604; Inquiry Activity: 65, 157; Section Assessment: 3.1, 4.4, 6.1, 12.1, 16.1; Application Lab: 118-119; Exploration Lab: 150 **Event-Based Science:** Representative Selections: **GOLD MEDAL!** 13-14 **BLACKOUT!** 14-15 **BLIGHT!** 35-36 **OIL SPILL!** 14 **EARTHQUAKE!** 25, 29, 34, 36-37 **GLOBAL WARMING!**: 9-13, 16

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	TR: 64C-64D, 92C-92D, 124C-124D; Teacher Demo: 68, 114, 310, 339, 451, 481; Build Science Skills: 68, 159, 160, 309, 460, 479, 536; Laboratory Manual: Recovering Oil, Desalinization by Distillation, Rivers That Shape the Land, Modeling Cavern Formation; Guided Reading and Study Workbook: 3.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Chapter Test: 3, 4, 6, 11, 12, 16, 17; Virtual Lab Record Sheets: Lab 8
	TECH: www.phschool.com; www.SciLinks.org; Discovery Video Field Trip: 64, 125, 216, 246, 278, 306, 362, 474, 502, 556, 586; Computer Test Bank: 3, 4, 6, 11, 12, 16, 17; Online Text: 3.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Teacher Express 1.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Transparencies: 37, 37; Virtual Lab CD: Lab 8
Determine if a systems approach will be helpful in answering a question or solving a problem. Represent the system with a diagram specifying components, boundaries, flows, and feedbacks. Describe relevant subsystems and the larger system that contains the system being analyzed. Determine how the system functions with respect to other systems.	**SE/TE:** 66-69, 85, 113-116, 158-163, 164-170, 171-179, 218-221, 222-227, 231-232, 269, 308-311, 336-341, 448-453, 459, 460, 479-482, 534-536, 746-747, 750, 751; How the Earth Works: 148, 208, 238, 298, 438, 494, 578, 604; Inquiry Activity: 65, 157; Section Assessment: 3.1, 4.4, 6.1, 12.1, 16.1; Application Lab: 118-119; Exploration Lab: 150 **Event-Based Science:** Representative Selections: **BLACKOUT!** 10-11,14-15 **FIRST FLIGHT!** 8-9, 16 **FLOOD!** 8-9, 13, 17-19 **TOXIC LEAK!** 17, 30 **EARTHQUAKE!** 25, 29, 36
	TR: 64C-64D, 92C-92D, 124C-124D; Teacher Demo: 68, 114, 310, 339, 451, 481; Build Science Skills: 68, 159, 160, 309, 460, 479, 536; Laboratory Manual: Recovering Oil, Desalinization by Distillation, Rivers That Shape the Land, Modeling Cavern Formation; Guided Reading and Study Workbook: 3.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Chapter Test: 3, 4, 6, 11, 12, 16, 17
	TECH: www.phschool.com; www.SciLinks.org; Discovery Video Field Trip: 64, 125, 216, 246, 278, 306, 362, 474, 502, 556, 586; Computer Test Bank: 3, 4, 6, 11, 12, 16, 17; Online Text: 3.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Teacher Express 1.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Transparencies: 37, 37

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Create a simplified model of a complex system. Trace the possible consequences of a change in one part of the system and explain how the simplified model may not be adequate to reliably predict consequences.	**SE/TE:** 2-5, 11-17, , 345, 350, 633, 647, 720-721, 729; Exploration Lab: 26-27; Inquiry Activity: 1; Section Assessment: 1.1, 1.3, 9.3 **Event-Based Science:** Representative Selections: **FIRST FLIGHT!** 8-9, 16, 21 **THRILL RIDE!** 21-22, 28-29, 33, 38-39 **BLIGHT!** 35-36 **FLOOD!** 48-49 **OIL SPILL!** 14, 38, 43-44
	TR: 246C-246D; Build Science Skills: 261; Teacher Demo: 4, 13, 262, 264; Laboratory Manual: Lab Skills Checkup 1-4, Using a Topographic Map to Create a Landform, Modeling a Plate Boundary; Guided Reading and Study Workbook: 1.1, 1.3, 9.3; Chapter Test: 1, 9
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 371, 372, 373; Discovery Channel Videos: Mapping the World; Teacher Express: 1.3, 9.3; Transparencies: 100, 101, 102, 104, 105, 107, 108, 109, 120; Discovery Channel Video Field Trip: Plate Tectonics; On-line Text: 1.1, 1.3, 9.3; Computer Test Bank: 1, 9
Analyze whether or not a system (e.g., population) is changing or in equilibrium. Determine whether a state of equilibrium is static or dynamic (i.e., inflows equal outflows).	**SE/TE:** 66-69, 85, 113-116, 158-163, 164-170, 171-179, 218-221, 222-227, 231-232, 269, 308-311, 336-341, 448-453, 459, 460, 479-482, 534-536, 746-747, 750, 751; How the Earth Works: 148, 208, 238, 298, 438, 494, 578, 604; Inquiry Activity: 65, 157; Section Assessment: 3.1, 4.4, 6.1, 12.1, 16.1; Application Lab: 118-119; Exploration Lab: 150 **Event-Based Science:** Representative Selections: **BLACKOUT!** 14-15, 22-23 **FIRST FLIGHT!** 8-9 **THRILL RIDE!** 21-22, 36-37 **FLOOD!** 17-19 **EARTHQUAKE!** 25, 29, 36
	TR: 64C-64D, 92C-92D, 124C-124D; Teacher Demo: 68, 114, 310, 339, 451, 481; Build Science Skills: 68, 159, 160, 309, 460, 479, 536; Laboratory Manual: Recovering Oil, Desalinization by Distillation, Rivers That Shape the Land, Modeling Cavern Formation; Guided Reading and Study Workbook: 3.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Chapter Test: 3, 4, 6, 11, 12, 16, 17

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	TECH: www.phschool.com; www.SciLinks.org; Discovery Video Field Trip: 64, 125, 216, 246, 278, 306, 362, 474, 502, 556, 586; Computer Test Bank: 3, 4, 6, 11, 12, 16, 17; Online Text: 3.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Teacher Express 1.1, 4.4, 6.1, 11.1, 12.1, 16.1, 17.1; Transparencies: 37, 37
EALR 2: Inquiry (INQ)	
Core Content: Conducting Analyses and Thinking Logically	
In prior grades, students learned to revise questions so they can be answered scientifically. In grades 9-12, students extend and refine their understanding of the nature of inquiry and their ability to formulate questions, propose hypotheses, and design, conduct, and report on investigations. Refinement includes an increased understanding of the kinds of questions that scientists ask and how the results reflect the research methods and the criteria that scientific arguments are judged by. Increased abilities include competence in using mathematics, a closer connection between student-planned investigations and existing knowledge, reflecting increased knowledge and improvements in communication and collaboration, and participation in a community of learners.	
Content Standards	
Students know that:	
9-12 INQA - Question - Scientists generate and evaluate questions to investigate the natural world.	**SE/TE:** 23-24, 728-733; Section Assessment: 1.5; Inquiry Activity: 1, 33, 65, 93, 125, 157, 187, 217, 247, 279, 307, 335, 363, 393, 421, 447, 475, 503, 531, 557, 587, 613, 643, 673, 699; Quick Lab: 82, 251, 287, 412, 590; Exploration Lab: 26, 58, 86, 150, 181, 210, 240, 272, 300, 326, 356, 414, 440, 468, 496, 524, 550, 606, 636, 666, 692, 723; Application Lab: 118, 386, 580; Problem-Solving Activity: 323 **TE:** 1C-1D **Event-Based Science:** Representative Selections: **FIRE!** 12-13,16-17, 18-19,, 34-35, 58, 63 **BLIGHT!** 24, 38-39, 46 **GOLD MEDAL!**: 36 **FIRST FLIGHT!**: 17 **OUTBREAK!**: 38
	TR: Laboratory Manual: Laboratory Manual: Science Safety Rules, Safety Symbols, Laboratory Safety Contract, Student Safety Test, Lab Skills Checkup 1-5, Labs for Chapters 1-21; Guided Reading and Study Workbook: 1.5; Chapter 1 Test; Test Prep Resources: Chapter 1; Virtual Lab Record Sheets: Lab 1-15
	TECH: www.phschool.com; www.SciLinks.org; Teacher Express: 1.5; Online Text: 1.5; Computer Test Bank: Chapter 1; Virtual Lab CD: Lab 1-15

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9-12 INQB - Investigate - Scientific progress requires the use of various methods appropriate for answering different kinds of research questions, a thoughtful plan for gathering data needed to answer the question, and care in collecting, analyzing, and displaying the data.	**SE/TE:** 16-17, 25, 56, 117, 269, 332, 352, 406, 454, 549, 635, 678-683, 722, 732-733, 742; Section Assessment: 24.2 **Event-Based Science:** Representative Selections: **FLOOD!** 48-49 **SURVIVE**! 21, 30-31, 36-38, 48-49 **ASTEROID!** 10, 23-24, 42-43 **GOLD RUSH!**: 20, 28 **EARTHQUAKE!**: 14-15
	TR: Teacher Demo: 679; Guided Reading and Study Workbook: 24.2; Chapter Test: 24; Virtual Lab Record Sheet: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.com; Transparencies: 353, 354, 355; On-line Text: 24.2; Teacher Express: 24.2; Computer Test Bank: 24; Virtual Lab CD: Labs 1-15
9-12 INQC - Explain - Conclusions must be logical, based on evidence, and consistent with prior established knowledge.	**SE/TE:** 23-24, 728-733; Section Assessment: 1.5; Inquiry Activity: 1, 33, 65, 93, 125, 157, 187, 217, 247, 279, 307, 335, 363, 393, 421, 447, 475, 503, 531, 557, 587, 613, 643, 673, 699; Quick Lab: 82, 251, 287, 412, 590; Exploration Lab: 26, 58, 86, 150, 181, 210, 240, 272, 300, 326, 356, 414, 440, 468, 496, 524, 550, 606, 636, 666, 692, 723; Application Lab: 118, 386, 580; Problem-Solving Activity: 323 **TE:** 1C-1D **Event-Based Science:** Representative Selections: **FIRST FLIGHT!** 16, 21, 32-33 **FLOOD!** 20-21 **OIL SPILL!** 14, 22-24, 29, 38, 39, 43-44 **TOXIC LEAK!** 16, 20, 26-27, 34 **SURVIVE**! 21, 30-31, 36-38, 48-49
	TR: Laboratory Manual: Science Safety Rules, Safety Symbols, Laboratory Safety Contract, Student Safety Test, Lab Skills Checkup 1-5, Labs for Chapters 1-21; Guided Reading and Study Workbook: 1.5; Chapter 1 Test; Test Prep Resources: Chapter 1; Virtual Lab Record Sheet: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.org; Teacher Express: 1.5; Online Text: 1.5; Computer Test Bank: Chapter 1; Virtual Lab CD: Labs 1-15

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9-12 INQD - Communicate Clearly - The methods and procedures that scientists use to obtain evidence must be clearly reported to enhance opportunities for further investigation.	**SE/TE:** 16-17, 25, 56, 117, 269, 332, 352, 406, 454, 549, 635, 678-683, 722; Section Assessment: 24.2 **Event-Based Science:** Representative Selections: **ASTEROID!** 10, 23-24, 42-43 **GLOBAL WARMING!** 8, 25-26, 41-42, 53 **EARTHQUAKE!** 14-15, 23, 29, 34 **GOLD RUSH!**: 20, 28 **FLOOD!**: 37
	TR: 1C-1D, 672C-672D; Teacher Demo: 679; Guided Reading and Study Workbook: 1.3, 24.2; Build Science Skills: 17; Chapter Test: 1, 24; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 353, 354, 355; Teacher Express: 1.3, 24.2; On-line Text: 1.3, 24.2; Computer Test Bank: 1, 24; Virtual Lab CD: Labs 1-15
9-12 INQE - Model - The essence of scientific investigation involves the development of a theory or conceptual model that can generate testable predictions.	**SE/TE:** 2-5, 11-17, , 345, 350, 633, 647, 720-721, 729; Exploration Lab: 26-27; Inquiry Activity: 1; Section Assessment: 1.1, 1.3, 9.3 **Event-Based Science:** Representative Selections: **FIRE!** 15, 40-41 **OUTBREAK!** 5, 38, 44-45 **FLOOD!** 10, 48-49 **OIL SPILL!** 14, 38, 39 **GLOBAL WARMING!** 8, 25-26, 41-42, 53 **EARTHQUAKE!** 14-15, 23, 29, 34
	TR: 246C-246D; Build Science Skills: 261; Teacher Demo: 4, 13, 262, 264; Laboratory Manual: Lab Skills Checkup 1-4, Using a Topographic Map to Create a Landform, Modeling a Plate Boundary; Guided Reading and Study Workbook: 1.1, 1.3, 9.3; Chapter Test: 1, 9; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 371, 372, 373; Discovery Channel Videos: Mapping the World; Teacher Express: 1.3, 9.3; Transparencies: 100, 101, 102, 104, 105, 107, 108, 109, 120; Discovery Channel Video Field Trip: Plate Tectonics; On-line Text: 1.1, 1.3, 9.3; Computer Test Bank: 1, 9; Virtual Lab CD: Labs 1-15

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9-12 INQF - Communicate - Science is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new evidence comes to light.	**SE/TE:** 16-17, 25, 56, 117, 269, 332, 352, 406, 454, 549, 635, 678-683, 722; Inquiry Activity: 643, 673, 699; Exploration Lab: 666, 692, 723; Section Assessment: 24.2 **Event-Based Science:** Representative Selections: **FRAUD!** 24 **ASTEROID!** 10, 23-24, 42-43 **EARTHQUAKE!** 14-15, 23, 29, 34 **TOXIC LEAK!**: 16 **GOLD RUSH!**: 20-21 **FIRE!**: 63
	TR: 1C-1D, 672C-672D; Teacher Demo: 679; Guided Reading and Study Workbook: 1.3, 24.2; Build Science Skills: 17; Chapter Test: 1, 24; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 353, 354, 355; Teacher Express: 1.3, 24.2; On-line Text: 1.3, 24.2; Discovery Channel Videos: Introduction to Space Exploration, Heavenly Bodies, Fireball, Stars: Life and Death; Computer Test Bank: 1, 24; Virtual Lab CD: Labs 1-15
9-12 INQG - Intellectual Honesty - Public communication among scientists is an essential aspect of research. Scientists evaluate the validity of one another's investigations, check the reliability of results, and explain inconsistencies in findings	**SE/TE:** 23-24, 728-733; Section Assessment: 1.5; Inquiry Activity: 1, 33, 65, 93, 125, 157, 187, 217, 247, 279, 307, 335, 363, 393, 421, 447, 475, 503, 531, 557, 587, 613, 643, 673, 699; Quick Lab: 82, 251, 287, 412, 590; Exploration Lab: 26, 58, 86, 150, 181, 210, 240, 272, 300, 326, 356, 414, 440, 468, 496, 524, 550, 606, 636, 666, 692, 723; Application Lab: 118, 386, 580; Problem-Solving Activity: 323 **TE:** 1C-1D **Event-Based Science:** Representative Selections: **OUTBREAK!** 44-45 **BLIGHT!** 10-11, 19, 27-28 **ASTEROID!** 10, 23-24, 42-43 **GLOBAL WARMING!** 8, 25-26, 41-42, 53, 63-64 **EARTHQUAKE!** 14-15, 23, 29, 34
	TR: Laboratory Manual: Laboratory Manual: Science Safety Rules, Safety Symbols, Laboratory Safety Contract, Student Safety Test, Lab Skills Checkup 1-5, Labs for Chapters 1-21; Guided Reading and Study Workbook: 1.5; Chapter 1 Test; Test Prep Resources: Chapter 1

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	TECH: www.phschool.com; www.SciLinks.org; Teacher Express: 1.5; Online Text: 1.5; Computer Test Bank: Chapter 1
9-12 INQH - Intellectual Honesty - Scientists carefully evaluate sources of information for reliability before using that information. When referring to the ideas or findings of others, they cite their sources of information.	**SE/TE:** 16-17, 25, 56, 117, 269, 332, 352, 406, 454, 549, 635, 678-683, 722; Section Assessment: 24.2 **Event-Based Science:** Representative Selections: **BLACKOUT!** 48-49, 52-53 **FLOOD!** 20-21 **ASTEROID!** 10, 23-24, 42-43 **GLOBAL WARMING!** 8, 25-26, 41-42, 53, 63-64 **EARTHQUAKE!** 14-15, 23, 29, 34
	TR: 1C-1D, 672C-672D; Teacher Demo: 679; Guided Reading and Study Workbook: 1.3, 24.2; Build Science Skills: 17; Chapter Test: 1, 24
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 353, 354, 355; Teacher Express: 1.3, 24.2; On-line Text: 1.3, 24.2; Computer Test Bank: 1, 24
Performance Expectations	
Students are expected to:	
Generate and evaluate a question that can be answered through a scientific investigation. Critique questions generated by others and explain whether or not the questions are scientific.	**SE/TE:** 23-24; 728-729, 730-731; Laboratory Manual: xix, xx, xxi, xxii, xxiii, 1 **Event-Based Science:** Representative Selections: **OIL SPILL!** 14, 22-24, 29, 38, 39, 43-44 **TOXIC LEAK!** 34 **SURVIVE**! 36-38 **ASTEROID!** 10, 23-24, 42-43 **GLOBAL WARMING!** 8, 25-26, 41-42, 53 **EARTHQUAKE!** 14-15, 23, 29, 34
	TR: Inquiry Activity: 1, 33, 65, 93, 125, 147, 187, 217, 247, 279, 307, 335, 363, 393, 421, 447, 475, 503, 531, 557, 587, 613, 643, 673, 699; Quick Lab: 82, 251, 287, 412, 590; Exploration Lab: 26, 58, 86, 150, 181, 210, 240, 272, 300, 326, 356, 414, 440, 468, 496, 524, 550, 606, 636, 666, 692, 723; Application Lab: 118, 386, 580; TE Laboratory Manual: xix, xx, xxi, xxii, xxiii, 1; Lesson Plans Booklet: Chapters 1-25; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.com; ExamView Test Bank CD-Rom; Virtual Lab CD-Rom; Online Text: 1.5; Virtual Lab CD: Labs 1-15

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Plan and conduct a scientific investigation, choosing a method appropriate to the question being asked. Collect, analyze, and display data using calculators, computers, or other technical devices when available.	**SE/TE:** 23-24, 728-733; Section Assessment: 1.5; Inquiry Activity: 1, 33, 65, 93, 125, 157, 187, 217, 247, 279, 307, 335, 363, 393, 421, 447, 475, 503, 531, 557, 587, 613, 643, 673, 699; Quick Lab: 82, 251, 287, 412, 590; Exploration Lab: 26, 58, 86, 150, 181, 210, 240, 272, 300, 326, 356, 414, 440, 468, 496, 524, 550, 606, 636, 666, 692, 723; Application Lab: 118, 386, 580; Problem-Solving Activity: 323 **TE only:** 1C-1D **Event-Based Science:** Representative Selections: **OIL SPILL!** 29, 43-44 **GLOBAL WARMING!** 25-26 **EARTHQUAKE!** 14-15, 23, 29, 34 **SURVIVE!**: 30 **Flood!**: 48-49
	TR: Laboratory Manual: Laboratory Manual: Science Safety Rules, Safety Symbols, Laboratory Safety Contract, Student Safety Test, Lab Skills Checkup 1-5, Labs for Chapters 1-21; Guided Reading and Study Workbook: 1.5; Chapter 1 Test; Test Prep Resources: Chapter 1; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.org; Teacher Express: 1.5; Online Text: 1.5; Computer Test Bank: Chapter 1; Virtual Lab CD: Labs 1-15
Draw conclusions supported by evidence from the investigation and consistent with established scientific knowledge. Analyze alternative explanations and decide which best fits the data.	**SE/TE:** 730-731; Student Edition Lab Worksheets: 161, 165, 169, 171, 175, 179, 181, 183, 185, 189, 191, 195, 197, 199, 203, 207, 209, 211, 213, 217, 219, 223, 225, 227, 229; Laboratory Manual: 7, 11, 17, 23, 31, 37, 41, 47, 53, 59, 65, 69, 73, 79, 85, 89, 93, 97, 101, 107, 111, 115, 119, 123, 129, 133, 137, 141, 145, 151, 157 **Event-Based Science:** Representative Selections: **BLIGHT!** 27-28, 35-36, 44 **OIL SPILL!** 14, 22-24, 29, 38, 39, 43-44 **TOXIC LEAK!** 16 **ASTEROID!** 10, 23-24, 42-43 **OUTBREAK!**: 30 **SURVIVE!**: 21

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	TR: Quick Lab: 82, 251, 287, 412, 590; Exploration Lab: 26, 58, 86, 150, 181, 210, 240, 272, 300, 326, 356, 414, 440, 468, 496, 524, 550, 606, 636, 666, 692, 723; Application Lab: 118, 386, 580; TE Laboratory Manual: 7, 11, 17, 23, 31, 37, 41, 47, 53, 59, 65, 69, 73, 79, 85, 89, 93, 97, 101, 107, 111, 115, 119, 123, 129, 133, 137, 141, 145, 151, 157; Lesson Plans Booklet: Chapters 1-25; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.com; ExamView Test Bank CD-Rom; Virtual Lab CD-Rom; Virtual Lab CD: Labs 1-15
Write a detailed laboratory report that includes: the question that motivated the study, a justification for the kind of investigation chosen, hypotheses (if any), a description of what was done, a summary of data in tables and graphs, and a conclusion, based on the evidence, that responds to the question.	**SE/TE:** 731; Inquiry Activities: Chapters 11, 15, 18, 19; Quick Lab: Chapters 3, 9, 10, 14, 21; Exploration Lab: Chapter 15; Application Lab: Chapters 4, 5, 6 **Event-Based Science:** Representative Selections: **BLIGHT!** 10-11, 19, 35-36 **OIL SPILL!** 14, 22-24, 29, 38, 39, 43-44 **ASTEROID!**: 10 **TOXIC LEAK!**: 20, 26-27, 34 **VOLCANO!**: 14-15, 60 **TORNADO!**: 54
	TR: Lesson Plans Booklet: Chapters 1-25
	TECH: www.phschool.com; www.SciLinks.com; Virtual Lab CD-Rom
Formulate one or more hypotheses based on a model or theory of a casual relationship. Demonstrate creativity and critical thinking to formulate and evaluate the hypotheses.	**SE/TE:** 23-24; 728-729, 730-731; Laboratory Manual: xix, xx, xxi, xxii, xxiii, 1 **Event-Based Science:** Representative Selections: **GLOBAL WARMING!** 8, 25-26, 41-42, 53 **FLOOD!** 10, 20-21, 48-49 **OIL SPILL!** 38 **TOXIC LEAK!** 16, 20, 26-27, 34 **ASTEROID!** 10, 23-24, 42-43 **EARTHQUAKE!** 14-15, 23, 29, 34
	TR: Inquiry Activity: 1, 33, 65, 93, 125, 147, 187, 217, 247, 279, 307, 335, 363, 393, 421, 447, 475, 503, 531, 557, 587, 613, 643, 673, 699; Quick Lab: 82, 251, 287, 412, 590; Exploration Lab: 26, 58, 86, 150, 181, 210, 240, 272, 300, 326, 356, 414, 440, 468, 496, 524, 550, 606, 636, 666, 692, 723; Application Lab: 118, 386, 580; TE Laboratory Manual: xix, xx, xxi, xxii, xxiii, 1; Lesson Plans Booklet: Chapters 1-25; Virtual Lab Record Sheets: Labs 1-15

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	TECH: www.phschool.com; www.SciLinks.com; ExamView Test Bank CD-Rom; Virtual Lab CD-Rom; Online Text: 1.5; Virtual Labs CD: Labs 1-15
Evaluate an investigation to determine if it was a valid means of answering the question, and whether or not the results were reliable. Describe the development of a scientific theory that illustrates logical reasoning, creativity, testing, revision, and replacement of prior ideas in light of new evidence.	**SE/TE:** 2-5, 11-17, , 345, 350, 633, 647, 720-721, 729; Exploration Lab: 26-27; Inquiry Activity: 1; Section Assessment: 1.1, 1.3, 9.3 **Event-Based Science:** Representative Selections: **FIRST FLIGHT!** 8-9, 16, 21 **OUTBREAK!** 44-45 **TOXIC LEAK!** 16, 20, 26-27, 34 **ASTEROID!** 10, 23-24, 42-43 **HURRICANE!**: 20-21
	TR: 246C-246D; Build Science Skills: 261; Teacher Demo: 4, 13, 262, 264; Laboratory Manual: Lab Skills Checkup 1-4, Using a Topographic Map to Create a Landform, Modeling a Plate Boundary; Guided Reading and Study Workbook: 1.1, 1.3, 9.3; Chapter Test: 1, 9; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 371, 372, 373; Discovery Channel Videos: Mapping the World; Teacher Express: 1.3, 9.3; Transparencies: 100, 101, 102, 104, 105, 107, 108, 109, 120; Discovery Channel Video Field Trip: Plate Tectonics; On-line Text: 1.1, 1.3, 9.3; Computer Test Bank: 1, 9; Virtual Labs CD: Labs 1-15
Participate in a scientific discussion about their own investigations and those performed by others. Respond to questions and criticisms, and if appropriate, revise explanations based on these discussions.	**SE/TE:** 23-24, 728-731; Section Assessment: 1.5 **Event-Based Science:** Representative Selections: **BLIGHT!** 19 **OIL SPILL!** 29 **TOXIC LEAK!** 20, 34 **EARTHQUAKE!** 14-15, 23, 29, 34 **OUTBREAK!**: 5
	TR: Laboratory Manual: Lab Checkup 2, 3, 4, Measuring Volume and Temperature; Guided Reading and Study Workbook: 1.5; Chapter Test: 1; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.org; Teacher Express: 1.5; On-line Text: 1.5; Computer Test Bank: 1; Virtual Labs CD: Labs 1-15

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Provide appropriate citations for all ideas, findings, and information used in any and all written reports. Explain the consequences for failure to provide appropriate citations.	**SE/TE:** 731; Inquiry Activities: Chapters 11, 15, 18, 19; Quick Lab: Chapters 3, 9, 10, 14, 21; Exploration Lab: Chapter 15; Application Lab: Chapters 4, 5, 6 **Event-Based Science:** Representative Selections: **FLOOD!** 20-21 **OIL SPILL!** 22-24 **TOXIC LEAK!** 26-27 **ASTEROID!** 23-24 **EARTHQUAKE!** 14-15, 23, 29, 34
	TR: Lesson Plans Booklet: Chapters 1-25
	TECH: www.phschool.com; www.SciLinks.com; Virtual Lab CD-Rom
EALR 3: Application (APP)	
Core Content: Science, Technology, and Society	
In prior grades, students learn to work with other members of a team to apply the full process of technological design and relevant science concepts to solve problems. In grades 9-12, students apply what they have learned to address societal issues and cultural differences. Students learn that science and technology are interdependent, that science and technology influence society, and that society influences science and technology. Students continue to increase their abilities to work with other students and to use mathematics and information technologies (when available) to solve problems. They transfer insights from those increased abilities to considering local, regional, and global issues. These insights and capabilities will help prepare students to solve societal and personal problems in future years.	
Content Standards	
Students know that:	
9-12 APPA - Science affects society and cultures by influencing the way many people think about themselves, others, and the environment. Society also affects science by its prevailing views about what is important to study, and by deciding what research will be funded.	**SE/TE:** 16-17, 25, 56, 117, 269, 332, 352, 406, 454, 549, 635, 678-683, 722; Inquiry Activity: 643, 673, 699; Exploration Lab: 666, 692, 723; Section Assessment: 24.2 **Event-Based Science:** Representative Selections: **OIL SPILL!** 2, 31-33, 40 **TOXIC LEAK!** 2-3, 6-7, 10-11, 18-19, 35 **SURVIVE!** 2, 6, 9, 14, 15, 16, 19, 24-25, 26, 28 **GLOBAL WARMING!** 14, 15, 27-28, 29-30, 58 **EARTHQUAKE!** 6-9, 23, 30, 34 **OUTBREAK!**: 46
	TR: 1C-1D, 672C-672D; Teacher Demo: 679; Guided Reading and Study Workbook: 1.3, 24.2; Build Science Skills: 17; Chapter Test: 1, 24
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 353, 354, 355; Teacher Express: 1.3, 24.2; On-line Text: 1.3, 24.2; Discovery Channel Videos: Introduction to Space Exploration, Heavenly Bodies, Fireball, Stars: Life and Death; Computer Test Bank: 1, 24

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9-12 APPB - The technological design process begins by defining a problem in terms of criteria and constraints, conducting research, and generating several different solutions.	**SE/TE:** 23-24, 728-731; Section Assessment: 1.5 **Event-Based Science:** Representative Selections: **THRILL RIDE!** 11-12, 21-22, 25-33, 28-29 **FLOOD!** 20-21, 39 **TOXIC LEAK!** 33, 34 **ASTERIOD!** 50-51 **EARTHQUAKE!** 25, 29, 34, 36, 41
	TR: Laboratory Manual: Lab Checkup 2, 3, 4, Measuring Volume and Temperature; Guided Reading and Study Workbook: 1.5; Chapter Test: 1; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.org; Teacher Express: 1.5; On-line Text: 1.5; Computer Test Bank: 1; Virtual Labs CD: Labs 1-15
9-12 APPC - Choosing the best solution involves comparing alternatives with respect to criteria and constraints, then building and testing a model or other representation of the final design.	**SE/TE:** 23-24, 728-731; Section Assessment: 1.5 **Event-Based Science:** Representative Selections: **FIRE!** 15, 40-41 **FIRST FLIGHT!** 16 **TOXIC LEAK!** 33, 34 **ASTERIOD!** 50-51 **EARTHQUAKE!** 25, 29, 34, 36, 41
	TR: Laboratory Manual: Lab Checkup 2, 3, 4, Measuring Volume and Temperature; Guided Reading and Study Workbook: 1.5; Chapter Test: 1; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.org; Teacher Express: 1.5; On-line Text: 1.5; Computer Test Bank: 1; Virtual Labs CD: Labs 1-15
9-12 APPD - The ability to solve problems is greatly enhanced by use of mathematics and information technologies.	**SE/TE:** 678-683; Section Assessment: 24.2 **Event-Based Science:** Representative Selections: **BLIGHT!** 52, 53 **SURVIVE!** 32-33, 58, 59 **VOLCANO!**: 57, 59 **BLACKOUT!**: 60-61 **TORNADO!**: 54
	TR: 672C-672D; Teacher Demo: 679; Guided Reading and Study Workbook: 24.2; Chapter Test: 24; Virtual Lab Record Sheets: Labs 1-15

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	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 353, 354, 355; Teacher Express: 24.2; On-line Text: 24.2; Computer Test Bank: 24; Virtual Labs CD: Labs 1-15
9-12 APPE - Perfect solutions do not exist. All technological solutions involve trade-offs in which decisions to include more of one quality means less of another. All solutions involve consequences, some intended others not.	**SE/TE:** T38-39; 16-17, 25, 56, 117, 269, 332, 352, 406, 454, 549, 635, 678-683, 722; Section Assessment: 24.2 **Event-Based Science:** Representative Selections: **GOLD MEDAL!** 34-35 **BLACKOUT!** 10-11, 14-15, 26-27 **FLOOD!** 39 **EARTHQUAKE!** 14-15, 23, 29, 34 **ASTEROID!**: 50-51
	TR: Teacher Demo: 679; Guided Reading and Study Workbook: 24.2; Chapter Test: 24
	TECH: www.phschool.com; www.SciLinks.com; Transparencies: 353, 354, 355; On-line Text: 24.2; Teacher Express: 24.2; Computer Test Bank: 24
9-12 APPF - It is important for all citizens to apply science and technology to critical issues that influence society.	**SE/TE:** T38-39; 16-17, 25, 56, 117, 269, 332, 352, 406, 454, 549, 635, 678-683, 722; Section Assessment: 24.2 **Event-Based Science:** Representative Selections: **TOXIC LEAK!** 2-3, 6-7, 35 **SURVIVE!** 2, 6, 9, 14, 15, 16, 19, 24-25, 26, 28, 32-33 **EARTHQUAKE!** 6-9, 23, 30, 34 **OUTBREAK!**: 3, 34 **FLOOD!:** 50 **BLIGHT!:** 38
	TR: Teacher Demo: 679; Guided Reading and Study Workbook: 24.2; Chapter Test: 24; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.com; Transparencies: 353, 354, 355; On-line Text: 24.2; Teacher Express: 24.2; Computer Test Bank: 24; Virtual Labs CD: Labs 1-15

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Performance Expectations	
Students are expected to:	
Describe ways that scientific ideas have influenced society or the development of differing cultures. List questions that scientists investigate that are stimulated by the needs of society (e.g., medical research, global climate change).	**SE/TE:** 16-17, 25, 56, 117, 269, 332, 352, 406, 454, 549, 635, 678-683, 722; Inquiry Activity: 643, 673, 699; Exploration Lab: 666, 692, 723; Section Assessment: 24.2 **Event-Based Science:** Representative Selections: **OUTBREAK!** 6, 10, 16, 17-18, 24, 31, 32-33, 46, 47 **BLIGHT!** 15, 24, 25, 36, 38-39, 42, 46, 48 **GLOBAL WARMING!** 14, 15, 27-28, 58 **EARTHQUAKE!** 6-9, 23, 30, 34 **TOXIC LEAK!**: 41-44 **EARTHQUAKE!**: 26-28
	TR: 1C-1D, 672C-672D; Teacher Demo: 679; Guided Reading and Study Workbook: 1.3, 24.2; Build Science Skills: 17; Chapter Test: 1, 24
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 353, 354, 355; Teacher Express: 1.3, 24.2; On-line Text: 1.3, 24.2; Discovery Channel Videos: Introduction to Space Exploration, Heavenly Bodies, Fireball, Stars: Life and Death; Computer Test Bank: 1, 24
Work collaboratively with other students to generate ideas for solving a problem. Identify criteria and constraints, research the problem, and generate several possible solutions.	**SE/TE:** 23-24, 728-731; Section Assessment: 1.5 **Event-Based Science:** Representative Selections: **BLIGHT!** 35-36 **OIL SPILL!** 22-24, 38 **GLOBAL WARMING!** 8, 25-26, 41-42, 53 **EARTHQUAKE!** 6-9, 14-15, 23, 29, 34, 41 **OUTBREAK!**: 5 **SURVIVE!**: 11
	TR: Laboratory Manual: Lab Checkup 2, 3, 4, Measuring Volume and Temperature; Guided Reading and Study Workbook: 1.5; Chapter Test: 1; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.org; Teacher Express: 1.5; On-line Text: 1.5; Computer Test Bank: 1; Virtual Labs CD: Labs 1-15

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Choose the best solution for a problem, create a model or drawing of the final design, and devise a way to test it. Redesign the solution, if necessary, then present it to peers.	**SE/TE:** 11-17, 729; Exploration Lab: 26-27; Section Assessment: 17 **Event-Based Science:** Representative Selections: **FIRE!** 15, 40-41 **THRILL RIDE!** 11-12, 21-22, 28-29, 33, 38-39 **OIL SPILL!** 38, 39 **ASTERIOD!** 50-51 **EARTHQUAKE!** 6-9, 14-15, 23, 29, 34, 41
	TR: Teacher Demo: 13; Laboratory Manual: Using a Topographic Map to Create a Landform; Chapter Test: 1; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 371, 372, 373; Discovery Channel Videos: Mapping the World; Teacher Express: 1.3; On-line Text: 1.3; Computer Test Bank: 1; Virtual Labs CD: Labs 1-15
Use proportional reasoning, functions, graphing, and estimation to solve problems. Use computers, probes, and software when available to collect, display, and analyze data.	**SE/TE:** 730-731; Student Edition Lab Worksheets: 161, 165, 169, 171, 175, 179, 181, 183, 185, 189, 191, 195, 197, 199, 203, 207, 209, 211, 213, 217, 219, 223, 225, 227, 229; Laboratory Manual: 7, 11, 17, 23, 31, 37, 41, 47, 53, 59, 65, 69, 73, 79, 85, 89, 93, 97, 101, 107, 111, 115, 119, 123, 129, 133, 137, 141, 145, 151, 157 **Event-Based Science:** Representative Selections: **OIL SPILL!** 22-24, 45 **ASTERIOD!** 42-43, 50-51, 51-52 **GLOBAL WARMING!** 27-28, 60, 61-62 **EARTHQUAKE!** 29, 41, 43 **GOLD RUSH!**: 20 **HURRICANE!**: 52
	TR: Quick Lab: 82, 251, 287, 412, 590; Exploration Lab: 26, 58, 86, 150, 181, 210, 240, 272, 300, 326, 356, 414, 440, 468, 496, 524, 550, 606, 636, 666, 692, 723; Application Lab: 118, 386, 580; TE Laboratory Manual: 7, 11, 17, 23, 31, 37, 41, 47, 53, 59, 65, 69, 73, 79, 85, 89, 93, 97, 101, 107, 111, 115, 119, 123, 129, 133, 137, 141, 145, 151, 157; Lesson Plans Booklet: Chapters 1-25; Virtual Lab Record Sheets: Labs 1-15
	TECH: www.phschool.com; www.SciLinks.com; ExamView Test Bank CD-Rom; Virtual Lab CD-Rom; Virtual Labs CD: Labs 1-15

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Analyze a societal issue that may be addressed through science and/or technology. Compare alternative solutions by considering trade-offs and unintended consequences (e.g., removing dams to increase salmon spawning).	**SE/TE:** 16-17, 25, 56, 117, 269, 332, 352, 406, 454, 549, 635, 678-683, 722; Inquiry Activity: 643, 673, 699; Exploration Lab: 666, 692, 723; Section Assessment: 24.2 **Event-Based Science:** Representative Selections: **FIRE!** 12-13, 18-19, 20-22, 34-35 **BLIGHT!** 36, 38-39, 42, 48 **FLOOD!** 1-2, 23 **TOXIC LEAK!** 2-3, 6-7, 33, 35 **SURVIVE!** 14, 32-33 **OUTBREAK!** 5, 6, 10, 16, 17-18, 24, 31, 32-33, 47
	TR: 1C-1D, 672C-672D; Teacher Demo: 679; Guided Reading and Study Workbook: 1.3, 24.2; Build Science Skills: 17; Chapter Test: 1, 24
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 353, 354, 355; Teacher Express: 1.3, 24.2; On-line Text: 1.3, 24.2; Discovery Channel Videos: Introduction to Space Exploration, Heavenly Bodies, Fireball, Stars: Life and Death; Computer Test Bank: 1, 24
Critically analyze scientific information in current events to make personal choices, or to inform public-policy decisions.	**SE/TE:** 16-17, 25, 56, 117, 269, 332, 352, 406, 454, 549, 635, 678-683, 722; Inquiry Activity: 643, 673, 699; Exploration Lab: 666, 692, 723; Section Assessment: 24.2 **Event-Based Science:** Representative Selections: **FLOOD!** 1-2, 28, 50 **OIL SPILL!** 31-33, 39, 40 **OUTBREAK!** 6, 10, 16, 17-18, 24, 31, 32-33, 47 **TOXIC LEAK!** 2-3, 6-7, 34, 35 **GLOBAL WARMING!** 14, 15, 58
	TR: 1C-1D, 672C-672D; Teacher Demo: 679; Guided Reading and Study Workbook: 1.3, 24.2; Build Science Skills: 17; Chapter Test: 1, 24
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 353, 354, 355; Teacher Express: 1.3, 24.2; On-line Text: 1.3, 24.2; Discovery Channel Videos: Introduction to Space Exploration, Heavenly Bodies, Fireball, Stars: Life and Death; Computer Test Bank: 1, 24

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EALR 4: Earth and Space Science	
Big Idea: Energy: Transfer, Transformation, and Conservation (PS3)	
Core Content: Evolution of the Universe	
In prior grades, students learned about other objects in the Solar System, and how they are held together by a force called —gravity. In grades 9-11, students learn the current scientific theory about the origin of the universe and subsequent formation of our Solar System. These discoveries are based on the important concept that the physical principles that apply today on Earth apply everywhere in the universe, now and in the distant past. These fundamental concepts help students make coherent sense of the universe and engage in further wondering and learning.	
Content Standards	
Students know that:	
9-11 ES1A - Stars have life cycles. During their active periods, stars produce heavier elements, starting with the fusion of hydrogen to form helium. The heaviest elements are formed when massive stars —die in massive explosions.	**SE/TE:** 700-706, 707-714; Inquiry Activity: 699, 723; Section Assessment: 25.1, 25.2 **Event-Based Science:** **ASTEROID!** 15, 21, 22 **GLOBAL WARMING?** 1
	TR: 698C-698D; Build Science Skills: 707; Teacher Demo: 701, 703, 707; Laboratory Manual: Modeling the Rotation of Neutron Stars; Guided Reading and Study Workbook: 25.1, 25.2; Chapter Test: 25
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 358, 359, 360, 361, 362, 363, 364, 365; Discovery Channel Videos: Stars: Life and Death; Teacher Express: 25.1, 25.2; On-line Text: 25.1, 25.2; Computer Test Bank: 25
9-11 ES1B - The Big Bang theory of the origin of the universe is based on evidence (e.g., red shift) that all galaxies are rushing apart from one another. As space expanded, and matter began to cool, gravitational attraction pulled clumps of matter together, forming the stars and galaxies, clouds of gas and dust, and planetary systems that we see today. If we were to run time backwards we would find that all of the galaxies were in the same place 14.7 billion years ago.	**SE/TE:** 10, 720-721; Section Assessment: 25.3 **Event-Based Science:** **ASTERIOID!** 22, 31 **GLOBAL WARMING?** 1
	TR: 698C-698D; Chapter Test: 25
	TECH: www.phschool.com; www.SciLinks.org; Teacher Express: 25.3; On-line Text: 25.3; Computer Test Bank: 25
Performance Expectations	
Students are expected to:	
Connect the life cycles of stars to the production of elements through the process of nuclear fusion.	**SE/TE:** 3-5, 647; Section Assessment: 1.1 **Event-Based Science:** **ASTEROID!** 21, 22 **GLOBAL WARMING?** 1

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	TR: 1C-1D; Teacher Demo: 4, 647; Build Science Skills: 5; Chapter Test: 1
	TECH: www.phschool.com; www.SciLinks.org; Teacher Express: 1.1; On-line Text: 1.1; Computer Test Bank: 1
Cite evidence that supports the Big Bang theory (e.g., red shift of galaxies).	**SE/TE:** 10, 720-721; Section Assessment: 25.3 **Event-Based Science:** **ASTERIOID!** 22, 31
	TR: 698C-698D; Chapter Test: 25
	TECH: www.phschool.com; www.SciLinks.org; Teacher Express: 25.3; On-line Text: 25.3; Computer Test Bank: 25
EALR 4: Earth and Space Science	
Big Idea: Earth Systems, Structures, and Processes (ES2)	
Core Content: Energy in Earth Systems	
In prior grades, students learned about planet Earth as an interacting system of solids, liquids, and gases, and about the water cycle, the rock cycle, and the movement of crustal plates. In grades 9-11, students learn how the uneven heating of Earth's surface causes differences in climate in different parts of the world, and how the tilt of Earth's axis with respect to the plane of its orbit around the Sun causes seasonal variations. Students also learn about the essential biogeochemical cycles that continuously move elements such as carbon and nitrogen through Earth systems. These major ideas about energy inputs and outputs in and around the Earth help students understand Earth as a dynamic system.	
Content Standards	
Students know that:	
9-11 ES2A - Global climate differences result from the uneven heating of Earth's surface by the Sun. Seasonal climate variations are due to the tilt of Earth's axis with respect to the plane of Earth's nearly circular orbit around the Sun.	**SE/TE:** 449-450, 532-537, 537-542, 543- 548, 558-563; Inquiry Activity: 531, 557; Exploration Lab: 550-551; Section Assessment: 16.1, 19.1, 19.2, 19.3, 20.1 **Event-Based Science:** **ASTERIOID!** 33, 42-43 **GLOBAL WARMING?** 24, 46-47
	TR: 530C-530D; 556C-556D; Teacher Demo: 451, 532, 533, 538, 559, 544; Build Science Skills: 536, 537; Laboratory Manual: Analyzing Pressure Systems; Guided Reading and Study Workbook: 16.1, 19.1, 19.2, 19.3, 20.1; Chapter 16, 19, 20 Test
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283; 284, 285, 286; Teacher Express: 16.1, 19.1, 19.2, 19.3, 20.1; Online Text: 16.1, 19.1, 19.2, 19.3, 20.1; Computer Test Bank: 16, 19, 20

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9-11 ES2B - Climate is determined by energy transfer from the sun at and near Earth's surface. This energy transfer is influenced by dynamic processes such as cloud cover and Earth's rotation, as well as static conditions such as proximity to mountain ranges and the ocean. Human activities, such as burning of fossil fuels, also affect the global climate.	**SE/TE:** 450, 588-591, 592-599, 600-603; Inquiry Activity: 587; Quick Lab: 590; Exploration Lab: 606-607; Section Assessment: 21.1, 21.2, 21.3 **Event-Based Science:** **ASTERIOID!** 1-2, 33 **GLOBAL WARMING?** 8, 9, 10-11, 20, 24, 43, 44 **HURRICANE!** 17 **VOLCANO!** 51 **TORNADO!** 3-4
	TR: 586C-586D; Teacher Demo: 589, 596, 601; Laboratory Manual: Modeling the Greenhouse Effect; Guided Reading and Study Workbook: 21.1, 21.2, 21.3; Chapter 21 Test
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314; Discovery Channel Videos: Polar Weather; Teacher Express: 21.1, 21.2, 21.3; Online Text: 21.1, 21.2, 21.3; Computer Test Bank: 21
9-11 ES2C - Earth is a system that contains a fixed amount of each stable chemical element, existing in different chemical forms. Each element on Earth moves among reservoirs in the solid Earth, oceans, atmosphere, and organisms as part of biogeochemical cycles, driven by energy from Earth's interior and from the Sun.	**SE/TE:** 85, 110, 136-137, 158-159, 494; Inquiry Activity: 157; Section Assessment: 5.1, 6.1 **Event-Based Science:** **GLOBAL WARMING?** 10-11, 12-13, 16, 20, 22
	TR: Build Science Skills: 137, 159; Guided Reading and Study Workbook: 5.1, 6.1; Chapter Test: 5, 6
	TECH: www.phschool.com; www.SciLinks.org; On-line Text: 5.1, 6.1; Teacher Express: 5.1, 6.1; Computer Test Bank: 5, 6
9-11 ES2D - The earth does not have infinite resources; increasing human consumption places severe stress on the natural processes that renew some resources and it depletes those resources that cannot be renewed.	**SE/TE:** 94-101, 102-107, 108-112, 113-116; Inquiry Activity: 93; Application Lab: 118-119; Section Assessment: 4.1, 4.2, 4.3, 4.4 **Event-Based Science:** **TOXIC LEAK!** 41-42 **GOLD RUSH!** 45
	TR: Teacher Demo: 96, 99, 105, 106, 111, 114; Build Science Skills: 96, 100, 103; Laboratory Manual: Recovering Oil, Desalinization by Distillation; Guided Reading and Study Workbook: 4.1, 4.2, 4.3, 4.4; Chapter 4 Test

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	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 19, 23, 24, 25; Teacher Express: 4.1, 4.2, 4.3, 4.4; Online Text: 4.1, 4.2, 4.3, 4.4; Discovery Channel Video: PET Clothes; Computer Test Bank: Chapter 4
Performance Expectations	
Students are expected to:	
Explain that Earth is warmer near the equator and cooler near the poles due to the uneven heating of Earth by the Sun. Explain that it's warmer in summer and colder in winter for people in Washington State because the intensity of sunlight is greater and the days are longer in summer than in winter. Connect these seasonal changes in sunlight to the tilt of Earth's axis with respect to the plane of its orbit around the Sun.	**SE/TE:** 449-450, 532-537, 537-542, 543- 548, 558-563; Inquiry Activity: 531, 557; Exploration Lab: 550-551; Section Assessment: 16.1, 19.1, 19.2, 19.3, 20.1 **Event-Based Science:** **ASTERIOID!** 33, 42-43 **GLOBAL WARMING?** 24, 46-47
	TR: 530C-530D; 556C-556D; Teacher Demo: 451, 532, 533, 538, 559, 544; Build Science Skills: 536, 537; Laboratory Manual: Analyzing Pressure Systems; Guided Reading and Study Workbook: 16.1, 19.1, 19.2, 19.3, 20.1; Chapter 16, 19, 20 Test
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283; 284, 285, 286; Teacher Express: 16.1, 19.1, 19.2, 19.3, 20.1; Online Text: 16.1, 19.1, 19.2, 19.3, 20.1; Computer Test Bank: 16, 19, 20
Explain how the climate in the Pacific Northwest region is affected by seasonal weather patterns, as well as other factors such as the addition of greenhouse gases to the atmosphere, and proximity to mountain ranges and to the ocean.	**SE/TE:** 94-101, 102-107, 117, 180, 410-411, 523; Inquiry Activity: 93; Section Assessment: 4.1, 4.2 **Event-Based Science:** **ASTERIOID!** 1-2, 33 **GLOBAL WARMING?** 8, 9, 10-11, 20, 24, 43, 44 **HURRICANE!** 17 **VOLCANO!** 51 **TORNADO!** 3-4
	TR: 92C-92D; Teacher Demo: 96, 99, 105, 106; Build Science Skills: 96, 100, 103, 411; Guided Reading and Study Workbook: 4.1, 4.2; Chapter Test: 4
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 19, 23, 24, 25; On-line Text: 4.1, 4.2; Teacher Express: 4.1, 4.2; Computer Test Bank: 4

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Describe the different forms taken by carbon and nitrogen, and the reservoirs where they are found. Give examples of carbon found on Earth (e.g., carbonate rocks such as limestone, in coal and oil, in the atmosphere as carbon dioxide gas, and in the tissues of all living organisms).	**SE/TE:** 38, 42, 49, 18-22, 85, 110, 113-116, 129, 176, 343, 350, 477, 483-487, 602, 646, 662; Quick Lab: 590; Application Lab: 118-119; Section Assessment: 4.4, 1.4, 17.2 **Event-Based Science:** **GLOBAL WARMING?** 10-11, 12-13, 16, 20, 22
	TR: 474C-474D; Teacher Demo: 484; Build Science Skills: 22, 484, 486; Laboratory Manual: Determining How Temperature Changes with Altitude, Recovering Oil, Desalinization by Distillation; Guided Reading and Study Workbook: 1.4, 4.4, 17.2; Chapter Test: 1, 4, 17
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 3, 4, 226, 227, 228, 230, 231; Discovery Channel Videos: PET Clothes; Teacher Express: 1.4, 4.4, 17.2; On-line Text: 1.4, 4.4, 17.2; Computer Test Bank: 1, 4, 17
Identify renewable and nonrenewable resources in the Pacific Northwest region. Explain how human use of natural resources stress natural processes and link that use to a possible long term consequence.	**SE/TE:** 94-101, 102-107, 108-112, 113-116; Inquiry Activity: 93; Application Lab: 118-119; Section Assessment: 4.1, 4.2, 4.3, 4.4 **Event-Based Science:** **TOXIC LEAK!** 41-42 **GOLD RUSH!** 45
	TR: Teacher Demo: 96, 99, 105, 106, 111, 114; Build Science Skills: 96, 100, 103; Laboratory Manual: Recovering Oil, Desalinization by Distillation; Guided Reading and Study Workbook: 4.1, 4.2, 4.3, 4.4; Chapter 4 Test
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 19, 23, 24, 25; Teacher Express: 4.1, 4.2, 4.3, 4.4; Online Text: 4.1, 4.2, 4.3, 4.4; Discovery Channel Video: PET Clothes; Computer Test Bank: Chapter 4

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EALR 4: Earth and Space Science	
Big Idea: Earth History (ES3)	
Core Content: Evolution of the Earth	
In prior grades, students learned about a few of the methods that have made it possible to uncover the history of our planet. In grades 9-11, students learn about the major changes in Earth systems over geologic time and some of the methods used to gather evidence of those changes. Methods include observation and measurement of sediment layers, using cores drilled from the sea bottom and from ancient glaciers, and the use of radioactive isotopes. Findings of Earth history include the existence of life as early as nearly 4 billion years ago and major changes in the composition of Earth's atmosphere.	
Content Standards	
Students know that:	
9-11 ES3A - Interactions among the solid Earth, the oceans, the atmosphere, and organisms have resulted in the ongoing evolution of the Earth system. We can observe changes such as earthquakes and volcanic eruptions on a human time scale, but many processes such as mountain building and plate movements take place over hundreds of millions of years.	**SE/TE:** 248-253, 254-260, 261-268, 269-270; Inquiry Activity: 247; Quick Lab: 252; Exploration Lab: 272-273; Section Assessment: 9.1, 9.2, 9.3, 9.4 **Event-Based Science:** **GLOBAL WARMING?** 1, 10-11, 12-13, 22, 31, 34-36 **TOXIC LEAK!** 29 **GOLD RUSH!** 22-23 **VOLCANO!** 3-4, 19-20, 38, 49-50 **FLOOD!** 16, 17-19, 32, 42 **EARTHQUAKE!** 16, 17, 21-23
	TR: 246C-246D; Teacher Demo: 249, 258, 262, 264; Build Science Skills: 251, 255, 257, 261, 270; Laboratory Manual: Modeling a Plate Boundary; Reteach: 277; Guided Reading and Study Workbook: 9.1, 9.2, 9.3, 9.4; Chapter Test: 9
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 1120, 111, 112, 113, 114, 115, 119, 120; Teacher Express: 9.1, 9.2, 9.3, 9.4; On-line Text: 9.1, 9.2, 9.3, 9.4; Discovery Channel Videos: Plate Tectonics; Computer Test: 9
9-11 ES3B - Geologic time can be estimated by several methods (e.g., counting tree rings, observing rock sequences, using fossils to correlate sequences at various locations, and using the known decay rates of radioactive isotopes present in rocks to measure the time since the rock was formed).	**SE/TE:** 336-341, 342-346, 347-351; Inquiry Activity: 335; Section Assessment: 12.1, 12.2, 12.3
	TR: 334C-334D; Teacher Demo: 343, 349; Build Science Skills: 344; Evaluate Understanding: 341; Reteach: 351; Guided Reading and Study Workbook: 12.1, 12.2, 12.3; Chapter Test: 12

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	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 150, 151, 152, 153, 154, 155, 156, 157, 158; Teacher Express: 12.1, 12.2, 12.3; On-line Text: 12.1, 12.2, 12.3; Discovery Channel Videos: Grand Canyon; Computer Test Bank: 12
9-11 ES3C - Evidence for one-celled forms of life—the bacteria—extends back billions of years. The appearance of life on Earth caused dramatic changes in the composition of Earth's atmosphere, which did not originally contain oxygen.	**SE/TE:** 4-5, 476-482; Inquiry Activity: 475; Section Assessment: 17.1 **Event-Based Science:** **SURVIVE!**: 25, 49 **GLOBAL WARMING?** 1
	TR: 474C-474D; Build Science Skills: 479; Teacher Demo: 481; Guided Reading and Study Workbook: 17.1; Chapter 17 Test
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 217, 218, 219, 220, 221, 222, 223, 224, 225; Discovery Channel Video: About Weather; Teacher Express: 17.1; Online Text: 17.1; Computer Test Bank: 17.1
9-11 ES3D - Data gathered from a variety of methods have shown that Earth has gone through a number of periods when Earth was much warmer and much colder than today.	**SE/TE:** 336-341, 342-346, 347-351; Inquiry Activity: 335; Section Assessment: 12.1, 12.2, 12.3 **Event-Based Science:** **GLOBAL WARMING?** 12-13, 23, 25-26, 49
	TR: 334C-334D; Teacher Demo: 343, 349; Build Science Skills: 344; Evaluate Understanding: 341; Reteach: 351; Guided Reading and Study Workbook: 12.1, 12.2, 12.3; Chapter Test: 12
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 150, 151, 152, 153, 154, 155, 156, 157, 158; Teacher Express: 12.1, 12.2, 12.3; On-line Text: 12.1, 12.2, 12.3; Discovery Channel Videos: Grand Canyon; Computer Test Bank: 12
Performance Expectations	
Students are expected to:	
Interpret current rock formations of the Pacific Northwest as evidence of past geologic events. Consider which Earth processes may have caused these landforms (e.g., erosion, deposition, and scraping of terrain by glaciers, floods, volcanic eruptions, tsunami), and construct a timeline showing the development of the landform.	**SE/TE:** 336-341, 347-351; Inquiry Activity: 335; Section Assessment: 12.1, 12.3 **Event-Based Science:** **GLOBAL WARMING?** 1, 10-11, 12-13, 22, 3 1, 34-36 **GOLD RUSH!** 22-23 **VOLCANO!** 3-4, 19-20, 38, 49-50 **FLOOD!** 16, 17-19, 32, 42 **EARTHQUAKE!** 16, 17, 21-23

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	TR: 334C-334D; Teacher Demo: 343, 349; Evaluate Understanding: 341; Reteach: 351; Guided Reading and Study Workbook: 12.1, 12.3; Chapter Test: 12
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 150, 151, 152, 153, 155, 156, 157, 158; Teacher Express: 12.1, 12.3; On-line Text: 12.1, 12.3; Discovery Channel Videos: Grand Canyon; Computer Test Bank: 12
Explain how decay rates of radioactive materials in rock layers are used to establish the timing of geologic events. Given a geologic event, explain multiple methods that could be used to establish the timing of that event.	**SE/TE:** 336-341, 342-346, 347-351; Inquiry Activity: 335; Section Assessment: 12.1, 12.2, 12.3
	TR: 334C-334D; Teacher Demo: 343, 349; Build Science Skills: 344; Evaluate Understanding: 341; Reteach: 351; Guided Reading and Study Workbook: 12.1, 12.2, 12.3; Chapter Test: 12
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 150, 151, 152, 153, 154, 155, 156, 157, 158; Teacher Express: 12.1, 12.2, 12.3; On-line Text: 12.1, 12.2, 12.3; Discovery Channel Videos: Grand Canyon; Computer Test Bank: 12
Compare the chemical composition of the Earth's atmosphere before bacteria and plants evolved and after they became widespread.	**SE/TE:** 4-5, 476-482; Inquiry Activity: 475; Section Assessment: 17.1 **Event-Based Science:** **GLOBAL WARMING?** 1
	TR: 474C-474D; Build Science Skills: 479; Teacher Demo: 481; Guided Reading and Study Workbook: 17.1; Chapter 17 Test
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 217, 218, 219, 220, 221, 222, 223, 224, 225; Discovery Channel Video: About Weather; Teacher Express: 17.1; Online Text: 17.1; Computer Test Bank: 17.1
Describe factors that change climates over long periods of time and cite methods that scientists have found to gather information on ancient climates.	**SE/TE:** 450, 588-591, 592-599, 600-603; Inquiry Activity: 587; Quick Lab: 590; Exploration Lab: 606-607; Section Assessment: 21.1, 21.2, 21.3 **Event-Based Science:** **GLOBAL WARMING?** 12-13, 23, 25-26, 49

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	TR: 586C-586D; Teacher Demo: 589, 596, 601; Laboratory Manual: Modeling the Greenhouse Effect; Guided Reading and Study Workbook: 21.1, 21.2, 21.3; Chapter 21 Test; Virtual Lab Record Sheets: Lab 8
	TECH: www.phschool.com; www.SciLinks.org; Transparencies: 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314; Discovery Channel Videos: Polar Weather; Teacher Express: 21.1, 21.2, 21.3; Online Text: 21.1, 21.2, 21.3; Computer Test Bank: 21; Virtual Labs CD: Lab 8