

Standard	Content Standards	Performance Expectations	<i>Earth &amp; Space Science: Exploring the Universe</i> Student Edition, Annotated Teacher Edition
			<b>Student CD:</b> SE in PDF format with audio files, Spanish activities, Interactive Laboratory activities, Presentation Builder, Graphic Organizer Software <b>Teacher CD:</b> ATE in PDF format, Instructional Interactivities, Presentation Builder, Science notebook and graphics organizer software, Spanish activities
<b>EALR 1: Systems (SYS) - Predictability &amp; Feedback</b>			
9-12 SYSA	<i>Feedback</i> is a process in which the <i>output</i> of a <i>system</i> provides information used to regulate the operation of the <i>system</i> . <i>Positive feedback</i> increases the disturbance to a <i>system</i> . <i>Negative feedback</i> reduces the disturbance to a <i>system</i> .	Give examples of a positive <i>feedback system</i> and <i>explain</i> its regulatory mechanism (e.g., global warming causes Earth's ice caps to melt, reflecting less energy to space, increasing temperatures).*a Give examples of a negative <i>feedback system</i> and <i>explain</i> its regulatory mechanism (e.g., when a human body overheats, it produces sweat that cools the body by evaporation).*a	Ch 13, pg 239 Ch 14, pg 250-251 Ch 15, pg 288-289 Ch 16, pg 298, 306 Ch 20, pg 382-383 Laboratory Manual, 14b Transparencies: 26- Water cycles, clouds; 33- Water cycle; 40- Ozone layer
9-12 SYSB	Systems thinking can be especially useful in analyzing complex situations. To be useful, a <i>system</i> needs to be specified as clearly as possible.	Determine if a <i>systems</i> approach will be helpful in answering a <i>question</i> or solving a problem.*b Represent the <i>system</i> with a diagram specifying components, boundaries, flows, and <i>feedbacks</i> .*a Describe relevant <i>subsystems</i> and the larger <i>system</i> that contains the <i>system</i> being analyzed.*a Determine how the <i>system functions</i> with respect to other <i>systems</i> .	Ch 14, pg 250-251, 254-266 Ch 16, pg 312-315 Ch 22, pg 413-415 Extend It pg 255 Figure It Out, pg 251, 256 Student Workbook, 91, 105 Laboratory Manual, 22b Student CD: Interactive Lab 22b Transparencies:26- Water cycle; 27- Air masses; 34- Water table, aquifers
9-12 SYSC	In complex <i>systems</i> , entirely new and unpredictable <i>properties</i> may emerge. Consequently, modeling a complex <i>system</i> in sufficient detail to make <i>reliable</i> predictions may not be possible.	Create a simplified <i>model</i> of a complex <i>system</i> . Trace the possible consequences of a change in one part of the <i>system</i> and <i>explain how</i> the simplified <i>model</i> may not be adequate to reliably <i>predict</i> consequences.	Ch 5, pg 74-76, 80-81 Ch 13, pg 244-245 Ch 14, pg 254-258 Explain It, pg 257 Extend It, pg 255 Figure It Out, pg 256 Student Workbook, 91 Laboratory Manual, 14b Transparencies:8- Rock cycle; 27- Air masses; 28- Fronts
9-12 SYSD	Systems can be changing or in equilibrium.	Analyze whether or not a <i>system</i> (e.g., population) is changing or in <i>equilibrium</i> . *c Determine whether a <i>state</i> of equilibrium is <i>static</i> or <i>dynamic</i> (e.g., inflows equal outflows).	Ch 13, pg 231-232, 238-240, 244-245 Did You Know, pg 231 Connection, pg 238 Student Workbook, 83 Transparency: 24- Radiation balance
<b>EALR 2: Inquiry (INQ) - Conducting Analyses &amp; Thinking Logically</b>			
9-12 INQA Question	Scientists <i>generate</i> and <i>evaluate questions</i> to <i>investigate</i> the <i>natural world</i>	Generate and <i>evaluate</i> a <i>question</i> that can be answered through a scientific investigation. Critique <i>questions generated</i> by others and <i>explain</i> whether or not the <i>questions</i> are scientific.*a	Ch 1, pg 8-9 Ch 7, pg 125 After You Read, pg 127 Explain It, pg 60 Explore It, pg 325 Reading Links, (ATE) pg 15 Unit Project, (ATE) pg 190 Student Workbook, e.g. 5 Transparency: 3- Scientific method

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9-12 INQB Investigate	Scientific progress requires the use of various methods appropriate for answering different kinds of research <i>questions</i> , a thoughtful plan for gathering data needed to answer the <i>question</i> , and care in collecting, analyzing, and displaying the data.	Plan and conduct a scientific investigation, choosing a method appropriate to the <i>question</i> being asked. Collect, analyze, and display data using calculators, computers, or other technical devices when available.*b	Ch 1, pg 9-13 <i>Explore It</i> , e.g. pg 13 <i>Extend It</i> , e.g. pg 97 <i>Explain It</i> , e.g. pg 89 <i>Appendix B</i> , pg 461 Laboratory Manual, e.g. 1b, 1c, 4b Unit Project (ATE), pg 190 Student CD: Graphic Organizer Transparency: 3- Scientific method
9-12 INQC Explain	Conclusions must be logical, based on <i>evidence</i> , and consistent with prior <i>established</i> knowledge.	Draw conclusions supported by <i>evidence</i> from the investigation and consistent with established scientific knowledge.*c Analyze alternative explanations and decide which best fits the data.*d	Ch 1, pg 10-11 <i>Explore It</i> , e.g. pg 61 <i>Investigative Reporting</i> , e.g. pg 188, 356 <i>Research the Big Picture</i> (ATE), e.g. 392-393, 458-459 Unit Projects, (ATE), e.g. pg 190 Reading Links, (ATE) e.g. pg 15 Laboratory Manual, e.g. 1b, 1c, 4b, 6b Student CD: Graphic Organizer Transparency: 3- Scientific method
9-12 INQD Communicate Clearly	The methods and procedures that scientists use to obtain <i>evidence</i> must be clearly reported to enhance opportunities for further investigation.	Write a detailed laboratory report that includes: the <i>question</i> that motivated the study, a justification for the kind of investigation chosen, <i>hypotheses</i> (if any), a description of what was done, a summary of data in tables and graphs, and a conclusion, based on the <i>evidence</i> , that responds to the <i>question</i> .	Ch 1, pg 11 <i>Explore It</i> , e.g. pg 61 <i>Appendix B</i> , pg 461 Laboratory Manual, e.g. 1b, 1c, 4b, 6a Unit Projects, (ATE), e.g. pg 148 Student CD: Graphic Organizer Transparency: 3- Scientific method
9-12 INQE Model	The essence of scientific investigation involves the development of a <i>theory</i> or conceptual <i>model</i> that can <i>generate testable</i> predictions.	Formulate one or more <i>hypotheses</i> based on a <i>model</i> or <i>theory</i> of a causal <i>relationship</i> . Demonstrate creativity and critical thinking to formulate and <i>evaluate</i> the <i>hypotheses</i> .	Ch 1, pg 8-9 <i>Extend It</i> , e.g. pg 127, 133 <i>Think About It</i> , e.g. pg 130 <i>Explore It</i> , pg 325 <i>Investigative Reporting</i> , e.g. pg 188 Student Workbook, e.g. 5 Transparency: 3- Scientific method
9-12 INQF Communicate	<i>Science</i> is a human endeavor that involves logical reasoning and creativity and entails the testing, revision, and occasional discarding of theories as new <i>evidence</i> comes to light.	<i>Evaluate</i> an investigation to determine if it was a <i>valid</i> means of answering the <i>question</i> , and whether or not the results were <i>reliable</i> . *e <i>Describe</i> the development of a scientific <i>theory</i> that illustrates logical reasoning, creativity, testing, revision, and replacement of prior <i>ideas</i> in light of new <i>evidence</i> .	Ch 1, pg 8-11 Ch 6, pg 93-98 Ch 24, pg 452-453 <i>After You Read</i> , pg 98, 455 <i>Figure It Out</i> , pg 94 <i>As You Read</i> , pg 453 <i>Connection</i> , pg 376, ATE pg 376 Transparencies: 3- Scientific method; 9- Continental drift; 48- Big Bang timeline
9-12 INQG Intellectual Honesty	Public <i>communication</i> among scientists is an essential aspect of research. Scientists <i>evaluate</i> the <i>validity</i> of one another's investigations, check the <i>reliability</i> of results, and <i>explain</i> inconsistencies in findings.	Participate in a scientific discussion about their own investigations and those performed by others. Respond to <i>questions</i> and criticisms, and if appropriate, revise explanations based on these discussions.	Ch 6, pg 93-98 Ch 24, pg 452-453 <i>Investigative Reporting</i> , pg 33 Unit Project, (ATE) pg 228 Laboratory Manual, e.g. 6c, 19c Transparencies: 3- Scientific method; 9- Continental drift; 48- Big Bang timeline

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9-12 INQH Intellectual Honesty	Scientists carefully <i>evaluate</i> sources of information for <i>reliability</i> before using that information. When referring to the <i>ideas</i> or findings of others, they cite their sources of information.	Provide appropriate citations for all <i>ideas</i> , findings, and information used in any and all written reports. <i>Explain</i> the consequences for failure to provide appropriate citations.	<i>Investigative Reporting</i> , pg 188 <i>Extend It</i> , e.g. pg 97 Unit Project, (ATE) pg 228 Research the Big Picture (ATE) e.g. pg 146-147 Laboratory Manual, e.g. 19c
<b>EALR 3: Application (APP) - Combining Science &amp; Technology to Solve Problems</b>			
9-12 APPA	<i>Science</i> affects society and cultures by influencing the way many people think about themselves, others, and the <i>environment</i> . Society also affects <i>science</i> by its prevailing views about what is important to study and by deciding what research will be funded.	<i>Describe</i> ways that scientific <i>ideas</i> have influenced society or the development of differing cultures. List <i>questions</i> that scientists <i>investigate</i> that are stimulated by the needs of society (e.g., medical research, <i>global climate</i> change).	Ch 19, pg 368-371 <i>Science Journal</i> , e.g. 32-33, 84 <i>Science Update</i> , e.g. pg 188, 392-393 <i>Career Connection</i> e.g. pg 392 <i>People in Science</i> e.g.. pg 385 Connection, pg 370, 376, ATE pg 376 Student Workbook, e.g.. 126 Unit Projects, (ATE), e.g.. pg 86 Reading Links, (ATE) each chapter, e.g. pg 15 Transparency: 39- Wind power
9-12 APPB	The <i>technological design process</i> begins by defining a problem in terms of <i>criteria</i> and <i>constraints</i> , conducting research, and generating several different solutions.	Work collaboratively with other students to <i>generate ideas</i> for solving a problem. Identify <i>criteria</i> and <i>constraints</i> , research the problem, and <i>generate</i> several possible <i>solutions</i> .	<i>Investigative Reporting</i> , pg 188 Unit Projects, (ATE), e.g.. pg 228 Research the Big Picture (ATE) e.g. pg 188 Student Workbook, e.g..128
9-12 APPC	Choosing the best <i>solution</i> involves comparing alternatives with respect to <i>criteria</i> and <i>constraints</i> , then building and testing a <i>mode</i> or other representation of the final design.	Choose the best <i>solution</i> for a problem, create a model or drawing of the final design, and devise a way to test it. Redesign the <i>solution</i> , if necessary, then present it to peers.*b	Research the Big Picture (ATE) e.g. pg 147 Laboratory Manual, i.e. 8a, 8c Student CD: Presentation Builder
9-12 APPD	The ability to solve problems is greatly enhanced by use of mathematics and information technologies.	Use proportional reasoning, <i>functions</i> , graphing, and estimation to solve problems.*a*b*c Use computers, probes, and software when available to collect, display, and analyze data.	Ch 1, pg 11-13 <i>Appendix B</i> , pg 461 <i>Explore It</i> , e.g. pg 13, 418 <i>Investigative Reporting</i> , e.g. pg 33 Student Workbook, e.g. 5 Laboratory Manual, e.g. 1b, 1c Unit Projects, (ATE), e.g. pg 394 Student CD: Presentation Builder. Graphic Organizer Transparency: 45- Inertia
9-12 APPE	Perfect <i>solutions</i> do not exist. All technological <i>solutions</i> involve <i>trade-offs</i> in which decisions to include more of one quality means less of another. All solutions involve consequences, some intended others not.	Analyze a societal issue that may be addressed through <i>science</i> and/or <i>technology</i> . <i>Compare</i> alternative <i>solutions</i> by <i>considering trade-offs</i> and unintended consequences (e.g., removing dams to increase salmon spawning).	Ch 13, pg 238-240 Ch 15, pg 287-291 Ch 18, pg 350-353 Ch 19, pg 368-371 Ch 20, pg 382-389 <i>Extend It</i> , pg 291, 388 <i>Science Update</i> , pg 356, 392-393 Student Workbook, e.g. 98, 108-109, 121, 126 Laboratory Manual, 19a, 19b, 19c Transparencies: 24- Radiation balance; 39- Wind power; 40- Landfills; 41- pH scale

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9-12 APPF	It is important for all citizens to <i>apply science</i> and <i>technology</i> to critical issues that influence society.	Critically analyze scientific information in current events to make personal choices, or to inform public-policy decisions.*d	Ch 15, pg 288-290 Ch 19, pg 368-371 <i>As You Read It</i> , pg 288 <i>Explain It</i> , pg 353 <i>Research and Report</i> , pg 146 <i>Science Journal</i> , 32-33 <i>Science Update</i> , e.g. pg 188, 392-393 <i>Career Connection</i> e.g. pg 392 Connection, pg 376, ATE pg 376 Student Workbook, e.g. 126 Laboratory Manual, 16b Transparency: 39- Wind power
<b>EALR 4: Earth and Space Science - Earth in Space (ES1) - <i>Evolution of the Universe</i></b>			
9-11 ES1A	Stars have " <i>life cycles</i> ." During their active periods, stars produce heavier <i>elements</i> , starting with the <i>fusion</i> of hydrogen to form helium. The heaviest <i>elements</i> are formed when massive stars "die" in massive explosions.	Connect the <i>life cycles</i> of stars to the production of <i>elements</i> through the process of nuclear <i>fusion</i> .	Ch 22, pg 414 Ch 23, pg 435-437, 441, 443-445 <i>Extend It</i> , pg 444 Student Workbook, 152-154, 156-158 Laboratory Manual, 23a, 23b, 23c Transparency: 46- Sun's atmosphere
9-11 ES1B	The <i>Big Bang theory</i> of the origin of the universe is based on <i>evidence</i> (e.g., red shift) that all galaxies are rushing apart from one another. As space expanded, and <i>matter</i> began to cool, gravitational attraction pulled clumps of <i>matter</i> together, forming the stars and galaxies, clouds of <i>gas</i> and dust, and <i>planetary systems</i> that we see today. If we were to run time backwards we would find that all of the galaxies were in the same place 13.7 billion years ago.	Cite <i>evidence</i> that supports the " <i>Big Bang theory</i> " (e.g., red shift of galaxies).	Ch 22, pg 413-414 Ch 24, pg 448-455 <i>Connection</i> , pg 454 <i>Figure It Out</i> , pg 452 <i>Extend It</i> pg 455 Student Workbook, 159-161 Laboratory Manual, 22b, 24a Student CD: Interactive Lab 22b Transparency: 48- Big Bang timeline
<b>EALR 4: Earth and Space Science - Earth Systems, Structures, and Processes (ES2) - <i>Energy in Earth Systems</i></b>			
9-11 ES2A	<i>Global climate</i> 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 <i>orbit</i> around the Sun.	<i>Explain that</i> Earth is warmer near the equator and cooler near the poles due to the uneven heating of Earth by the Sun. <i>Explain that</i> 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 <i>orbit</i> around the Sun.	Ch 13, pg 241-242 Ch 15, pg 283-285 Ch 21, pg 396-399 <i>Figure It Out</i> , pg 398 Student Workbook, 98-99, 139 Laboratory Manual, 15b, 15c, 21a Transparencies: 25- Global wind systems; 32- Earth's tilt; 42- Time zones

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9-11 ES2B	<i>Climate</i> is determined by <i>energy transfer</i> from the sun at and near Earth's surface. This <i>energy transfer</i> 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 <i>fossil fuels</i> , also affect the <i>global climate</i> .	<i>Explain how</i> the climate in the Pacific Northwest region is affected by seasonal weather <i>patterns</i> , as well as other <i>factors</i> such as the addition of greenhouse <i>gases</i> to the atmosphere, and proximity to mountain ranges and to the ocean.	Ch 8, pg 140 Ch 13, pg 229-234, 236-240, 244-245 Ch 14, pg 251-252 Ch 15, pg 274-276, 280, 283, 287-290 Ch 20, pg 381- 383 <i>After You Read</i> , pg 240 <i>Science Journal</i> , pg 84 <i>Connection</i> , pg 240 <i>Explain It</i> , pg 280 <i>Did You Know</i> , pg 234 Student Workbook 83-85 Laboratory Manual 13b, 13c, 20b Student CD: Interactive Lab, 20b Transparencies:24- Atmospheric layers; 25- Global wind system; 26- Water cycle; 30- Latitude; 40- Ozone layer
9-11 ES2C	Earth is a <i>system</i> that contains a fixed amount of each stable chemical <i>element</i> , existing in different chemical forms. Each <i>element</i> on Earth moves among reservoirs in the solid Earth, oceans, atmosphere, and <i>organisms</i> as part of <i>biogeochemical cycles</i> , driven by energy from Earth's interior and from the Sun.	<i>Describe</i> the different forms taken by carbon and nitrogen, and the reservoirs where they are found. <i>Give examples</i> of carbon found on Earth (e.g., carbonate rocks such as limestone, in coal and oil, in the atmosphere as carbon dioxide <i>gas</i> , and in the tissues of all living <i>organisms</i> ).	Ch 1, pg 6 Ch 3, pg 36-37, 41, 44-45 Ch 5, pg 66, 75-76 Ch 11, pg 200-201 Ch 12, pg 212-213 Ch 13, pg 231, 233, 235, 239 Ch 15, pg 288-291 Ch 17, pg 324 Ch 19, pg 361, 363, 366 <i>After You Read</i> , pg 291 <i>Figure It Out</i> , pg 233, 289 Student Workbook, 15, 83 Laboratory Manual, 12c, 13b Student CD: Interactive Lab,13b Transparencies:21- Half life; 24- Radiation balance; 38- Energy use
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.	<i>Identify</i> renewable and nonrenewable resources in the Pacific Northwest region. <i>Explain</i> how human use of natural resources stress natural processes and link that use to a possible long term consequence.	Ch 9, pg 162-163 Ch 15, pg 287-291 Ch 18, pg 341 Ch 19, pg 359- 371 Ch 20, pg 374-389 <i>Extend It</i> pg 291 <i>Figure It Out</i> , pg 289 <i>Science Journal</i> , pg 84 <i>Science Update</i> , pg 356-357, 392-393 <i>Connection</i> , pg 371, 392, 291, 341, 370, 376 Student Workbook, 101-102, 124-137 Laboratory Manual, 19a-19c, 20a-20c Student CD: Interactive Lab 20b,20c Transparencies:37- Life zones; 38- Annual oil consumption; 39- Wind power; 40- Landfills; 41- pH scale
<b>EALR 4: Earth and Space Science - Earth History (ES3) - <i>Evolution of the Earth</i></b>			

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9-11 ES3A	<i>Interactions</i> among the solid Earth, the oceans, the atmosphere, and <i>organisms</i> have resulted in the ongoing <i>evolution</i> of the Earth <i>system</i> . 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.	Interpret current rock formations of the Pacific Northwest as <i>evidence</i> of past geologic events. <i>Consider</i> which Earth processes may have caused these landforms (e.g., <i>erosion</i> , deposition, and scraping of terrain by glaciers, floods, volcanic eruptions, <i>tsunami</i> ), and construct a timeline showing the development of the landform.	Ch 6, pg 92-109 Ch 7, pg 113-117, 123 Ch 8, pg 131-141 Ch 10, 166-185 <i>Figure It Out</i> , pg 94, 100, 107, 115, 173, 180 <i>As You Read</i> , pg 101, 106, 109, 175 <i>Did You Know</i> , pg 102, 104, 109 <i>Extend It</i> , pg 133, 185 <i>Explore It</i> , pg 107 <i>Science Update</i> , pg 146-147 <i>Research and Report</i> , pg 146 <i>After You Read</i> , pg 104, 109 Student Workbook, 35, 37, 38-42, 44, 47, 49, 54-55, 62-68 Laboratory Manual, 6a- 6c, 7b, 7c, 8a, 8b, 10a, 10b Student CD: Interactive Labs, 7c Transparencies: 9-Continental Drift; 10- Tectonic plates; 11- Convergent boundaries; 12- Faulting; 13- Earthquakes; 14- Active volcanoes; 17- Breakwaters; 18- Wind erosion; 19- Mass movement
9-11 ES3B	Geologic time can be estimated by several methods (e.g., counting tree rings, observing rock sequences, using <i>fossils</i> 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).	<i>Explain how</i> decay rates of radioactive materials in rock layers are used to establish the timing of geologic events. *a Given a geologic event, <i>explain</i> multiple methods that could be used to establish the timing of that event.	Ch 5, pg 76, 80-81 Ch 6, pg 93-94, 97 Ch 11, pg 191-203 Ch 12, pg 206-223 <i>Connection</i> , pg 202, 203, 227 <i>Figure It Out</i> , pg 193, 197, 201, 208, 217, 222 <i>Extend It</i> , pg 80, 202, 209, 219 Student Workbook, 35, 37, 69-80 Laboratory Manual, 5b, 6b, 6c, 11a, 11b, 11c, 12a, 12b, 12c Student CD: Interactive labs 11b, 11c Transparencies: 8- Rock cycles; 9- Earth's layers; 20- Grand Canyon; 21- Half life
9-11 ES3C	<i>Evidence</i> 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.	<i>Compare</i> the chemical composition of the Earth's atmosphere before bacteria and plants evolved and after they became widespread.	Ch 12, pg 207-208, 212-213 Ch 13, pg 230-231 Ch 22, pg 423-424 <i>As You Read</i> , pg 213 <i>Figure It Out</i> , pg 208 Student Workbook, 76 Transparency: 22- Earth's geologic time table
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.	<i>Describe factors</i> that change climates over long periods of time and cite methods that scientists have found to gather information on ancient climates.	Ch 8, pg 140-141 Ch 11, pg 195, 198, 202-203 Ch 12, pg 210-211, 215, 219, 220-221 Ch 15, pg 282, 284-286 Ch 17, pg 323 <i>Connection</i> , pg141 <i>Explain It</i> , pg 219 <i>Investigative Reporting</i> , pg 226 <i>Science Update</i> , pg 226-227 Transparencies:21- Unconformities; 23- N. America's Ice Age; 32- Earth's tilt, wobble