



Alignment Document
State of New Hampshire and Aventa Learning Earth Science

Earth Science
2005-2007 Benchmark Blueprint

Domain	Strands	Standards	Unit Name	Course Topic Description
Science Process Skills	S:SPS1:11 Scientific Inquiry and Critical Thinking Skills (INQ) S:SPS1:11.1 Making Observations and Asking Questions.	S:SPS1:11:1.1 Ask questions about relationships among variables that can be observed directly as well as those that cannot.		
		S:SPS1:11:1.2 Use complex classification criteria and keys to identify items/organisms.		
		S:SPS1:11:1.3 Evaluate complex methods of classification for a specific purpose.		
		S:SPS1:11:1.4 Identify limitations of a given classification system and identify alternative ways of classifying to accommodate anomalies.		
	S:SPS1:11.2 Designing Scientific Investigations	S:SPS1:11:2.1 Apply scientific theories and laws to new situations to generate hypotheses.		
		S:SPS1:11:2.2 State a hypothesis and prediction based on available evidence and background information.		
	S:SPS1:11.3 Conducting Scientific Investigations	S:SPS1:11:3.1 Select and use apparatus and material safely.		
		S:SPS1:11:3.2 Use instruments effectively and accurately for collecting data.		

		S:SPS1:11:3.3 Compile and organize data, using appropriate units.		
	S:SPS1:11.4 Representing and Understanding Results of Investigations	S:SPS1:11:4.1 Compile and display data, evidence and information by hand and computer, in a variety of formats, including diagrams, flow charts, tables, graphs and scatter plots.		
	S:SPS1:11.5 Evaluating Scientific Explanations	S:SPS1:11:5.1 Explain how data support or refute the hypothesis or prediction. S:SPS1:11:5.2 Provide a statement that addresses and answers the question investigated in light of the evidence generated in the investigation.		
	S:SPS2:11 Unifying Concepts of Science. S:SPS2:11.1 Nature of Science (NOS)	S:SPS2:11:1.1 Explore new phenomena through investigations conducted for different reasons, or to check on previous results.		
S:SPS2:11:1.2 Test how well a theory predicts a phenomena.				
S:SPS2:11:1.3 Recognize that sometimes scientists can control conditions in order to focus on the effect of a single variable; when that is not possible for practical or ethical reasons, they try to observe as wide a range of natural occurrences as possible to be able to discern patterns.				
S:SPS2:11:1.4 Show how hypotheses are widely used in science for choosing what data to pay attention to and what additional data to seek, and for guiding the interpretation of the data (both new and previously available).		Planet Earth	Formulating a hypothesis	
		S:SPS2:11:1.5 Understand that in the long run, theories are judged by how they fit with other theories, the range of		

		<p>observations they explain, how well they explain observations, and how effective they are in predicting new findings.</p> <p>S:SPS2:11:1.6 Show how the usefulness of a model can be tested by comparing its predictions to actual observations in the real world; but a close match does not mean that the model is the only "true" model or the one that would work.</p> <p>S:SPS2:11:1.7 Realize that in science, the testing, revising, and occasional discarding of theories, new and old, never ends; this ongoing process leads to an increasingly better understanding of how things work in the world but not to absolute truth.</p>		
	S:SPS2:11.2 Systems and Energy (SAE)	<p>S:SPS2:11:2.1 Realize that systems may be so closely related that there is no way to draw boundaries that separate all parts of one from all parts of the others.</p> <p>S:SPS2:11:2.2 Give examples to show that a system usually has some properties that are different from those of its parts, but appear because of the interaction of those parts.</p> <p>S:SPS2:11:2.3 Demonstrate that even in some very simple systems, it may not always be possible to predict accurately the result of changing some part or connection.</p>	Planet Earth	Think Like an Earth Scientist
	S:SPS2:11.3 Models and Scale (MAS) (Evidence, Models, Measurement, and Explanation)	<p>S:SPS2:11:3.1 Understand that the basic idea of mathematical modeling is to find a mathematical relationship that behaves in the same way as the objects or processes under investigation; a mathematical model may give insight about how something</p>		

		really works or may fit observations very well without any intuitive meaning.		
	S:SPS2:11.4 Patterns of Change (POC)	S:SPS2:11:4.1 Recognize that things can change in detail, but remain the same in general (e.g., the players change but the team remains, the cells are replaced but the organism remains); sometimes counterbalancing changes are necessary for a thing to retain its essential constancy in the presence of changing conditions.		
		S:SPS2:11:4.2 Describe how graphs and equations are useful (and often equivalent) ways for depicting and analyzing patterns of change.		
		S:SPS2:11:4.3 Give examples of how a system in equilibrium may return to the same state of equilibrium if the disturbances it experiences are small; but large disturbances may cause it to escape that equilibrium and eventually settle into some other state of equilibrium.		
		S:SPS2:11:4.4 Describe how in evolutionary change, the present arises from the materials and forms of the past, more or less gradually, and in ways that can be explained.		
	S:SPS2:11.5 Form and Function (FAF)	S:SPS2:11:5.1 Explore how the movement of ocean floor plates under continental plates or two continental plates moving against each other can deform the earth's surface.	Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Divergent Boundaries
			Plate Tectonics, Volcanoes, Earthquakes, and Deformation of	Convergent Boundaries

			Earth's Crust Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Transform Boundaries
		S:SPS2:11:5.2 Provide data and evidence on how folding in crustal plates can cause mountain ranges.		
		S:SPS2:11:5.3 Understand that an atom's electron configuration determines how the atom can interact with other atoms.	Minerals, Rocks, and the Rock Cycle	Basic Chemistry and Atomic Structure of Matter
		S:SPS2:11:5.4 Provide examples of how configuration of atoms in a molecule determines a molecule's properties.	Minerals, Rocks, and the Rock Cycle	Basic Chemistry and Atomic Structure of Matter
		S:SPS2:11:5.5 Discover how the shape of large molecules affects the interaction with other molecules.		
		S:SPS2:11:5.6 Demonstrate that a variety of biological, chemical and physical phenomena can be explained by changes in the arrangement and motion of atoms and molecules.	Minerals, Rocks, and the Rock Cycle	Basic Chemistry and Atomic Structure of Matter
	S:SPS3:11 Personal, Social, and Technological Perspectives S:SPS3:11.1 Collaboration in Scientific Endeavors	S:SPS3:11:1.1 Collaborate with existing research efforts.		
		S:SPS3:11:1.2 Identify global researchers in a field of interest.		
	S:SPS3:11.2 Common Environmental Issues, Natural Resources Management and Conservation	S:SPS3:11:2.1 Develop, modify, clarify and explain questions that guide environmental investigations of various types.		
		S:SPS3:11:2.2 Design investigations to answer particular questions about the environment.		
		S:SPS3:11:2.3 Locate and collect reliable		

		information for environmental investigations of many types.		
		S:SPS3:11:2.4 Apply basic logic and reasoning skills to evaluate completeness and reliability in a variety of information sources.		
		S:SPS3:11:2.5 Organize and display information in ways appropriate to different types of environmental investigations and purposes.		
		S:SPS3:11:2.6 Create, use and evaluate models to understand environmental phenomena.		
		S:SPS3:11:2.7 Use to evidence and logic in developing proposed explanations that address their initial questions and hypotheses.		
		S:SPS3:11:2.8 Analyze global, social, cultural, political, economic and environmental linkages.		
		S:SPS3:11:2.9 Evaluate presentations of environmental issues for accuracy.		
	S:SPS3:11.3 Science and Technology, Technological Design and Application	S:SPS3:11:3.1 Analyze environmental issues such as water quality, air quality, hazardous waste, and depletion of natural resources.		
		S:SPS3:11:3.2 Evaluate status of a local community system (transportation, water, communication, food resources or electrical) in partnership with local officials.		
		S:SPS3:11:3.3 Analyze technical writing, graphs, charts, and diagrams.		
	S:SPS4:11 Science Skills for Information, Communication and Media Literacy (from ICT Literacy	S:SPS4:12:1.1 Select and analyze information from various sources (including electronic resources, print		

	<p>Map for Science, www.21stcenturyskills.org) S:SPS4:11.1 Information and Media Literacy</p>	<p>resources, community resources) and personally collected data to answer questions being investigated.</p>		
		<p>S:SPS4:12:1.2 Collect and use qualitative and quantitative data and information, seek evidence and sources of information to identify flaws such as errors and bias, and explain how the evidence supports or refutes an initial hypothesis.</p>		
		<p>S:SPS4:12:1.3 Analyze data and information gathered to clarify problems or issues identifying costs and benefits from a social, cultural, and/or environmental perspective; predict the consequences of action or inaction; and propose possible solutions.</p>		
	<p>S:SPS4:11.2 Communication Skills</p>	<p>S:SPS4:12:2.1 Select and use appropriate scientific vocabulary to orally share and communicate scientific ideas, plans, results, and conclusions resulting from investigations.</p>		
		<p>S:SPS4:12:2.2 Create written reports and journals to share and communicate scientific ideas, plans, results, and conclusions resulting from observations and investigations.</p>		
		<p>S:SPS4:12:2.3 Create a multimedia presentation incorporating numeric symbolic and/or graphic modes of representation to share scientific ideas, plans, results, and conclusions.</p>		
<p>S:SPS4:11.3 Critical Thinking and Systems Thinking</p>	<p>S:SPS4:12:3.1 Pursue scientific inquiry such as observation, measurement, hypothesis formation and analysis, and value "habits of mind" such as persistence, accuracy, and collaboration.</p>			

		S:SPS4:12:3.2 Generate solutions to scientific questions and challenges through developing, modeling and revising investigations.		
		S:SPS4:12:3.3 Apply scientific knowledge and skills to make reasoned decisions about the use of science and scientific innovations.		
S:SPS4:11.4 Problem Identification, Formulation, and Solution		S:SPS4:12:4.1 Formulate scientific questions about an issue and define experimental procedures for finding answers.		
		S:SPS4:12:4.2 Plan and conduct practical tests to solve problems or answer a question, collect and analyze data using appropriate instruments and techniques safely and accurately.		
		S:SPS4:12:4.3 Develop models and explanations to fit evidence obtained through investigations.		
S:SPS4:11.5 Creativity and Intellectual Curiosity		S:SPS4:12:5.1 Prepare multimedia presentations to share results of investigations, demonstrating a clear sense of audience and purpose.		
		S:SPS4:12:5.2 Use electronic networks to share information.		
		S:SPS4:12:5.3 Model solutions to a range of problems in science and technology using computer simulation software.		
S:SPS4:11.6 Interpersonal and Collaborative Skills		S:SPS4:12:6.1 Create a culminating team project that demonstrates content knowledge and conceptual understanding and shows connections between science content and real-world settings.		
		S:SPS4:12:6.2 Collect, synthesize, and report information from a variety of points		

		of view.		
	S:SPS4:11.7 Self Direction	S:SPS4:12:7.1 Use key ideas of science to document and explain through an investigation the relationship between science and concepts.		
		S:SPS4:12:7.2 Self-assess progress toward a predetermined outcome and decide what needs to be done to meet the goal.		
	S:SPS4:11.8 Accountability and Adaptability	S:SPS4:12:8.1 Identify the reputable and appropriate communities of learners to whom research findings should be reported, compare data, and adapt as needed.		
		S:SPS4:12:8.2 Use science learned to create a personal action plan on a community issue.		
	S:SPS4:11.9 Social Responsibility	S:SPS4:12:9.1 Collaborate with interested learners using appropriate web resources and publication media such as journals (print and electronic).		
Earth Space Science	S:ESS1:11 The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes. S:ESS1:11.1 Atmosphere, Climate, and Weather	S:ESS1:11:1.1 Explain how winds and ocean currents are created on the Earth's surface.	World of Weather	Wind
		S:ESS1:11:1.2 Explain how heat and energy transfer in and out of the atmosphere; and provide examples of how it is related to weather and climate.	Atmosphere and Climate	Heat is Energy
		S:ESS1:11:1.3 Describe how Earth's atmospheric composition has changed from the formation of the Earth through current time.	Atmosphere and Climate	Origins of Earth's Atmosphere
		S:ESS1:11:1.4 Explain how Earth's features can affect wind and weather patterns by causing air to rise and increasing precipitation.	World of Weather	Wind

	S:ESS1:11.2 Composition and Features	S:ESS1:11:2.1 Recognize that elements exist in fixed amounts and describe how they move through the solid Earth, oceans, atmosphere, and living things as part of geochemical cycles, such as the water, carbon and nitrogen cycles.	Planet Earth	The Climate System
		S:ESS1:11:2.2 Describe the conditions that enable the Earth to support life, such as the availability of water, the gravitational force, the electromagnetic field and the intensity of radiation from the Sun.		
		S:ESS1:11:2.3 Explain the theory of plate tectonics.	Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Plate Tectonics
		S:ESS1:11:2.4 Describe the movement of crustal plates and explain how the effects have altered the Earth's features.	Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Divergent Boundaries
	Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust		Convergent Boundaries	
S:ESS1:11.3 Fossils and Geologic Time	S:ESS1:11:3.1 Identify and describe the methods used to measure geologic time,	Geological Time	Relative Time Scale	

		such as fossil identification, radioactive dating, and rock sequences.	Geological Time	Numeric Time Scale
		S:ESS1:11:3.2 Relate how geologic time is determined using various dating methods (e.g., radioactive decay, rock sequences, fossil records).	Geological Time Geological Time	Relative Time Scale Numeric Time Scale
	S:ESS1:11.4 Observation of the Earth from Space	S:ESS1:11:4.1 Provided with geologic data (including movement of plates) on a given locale, predict the likelihood for an earth event (e.g. volcanoes mountain ranges, islands, earthquakes, tides, tsunamis).		
	S:ESS1:11.5 Processes and Rates of Change	S:ESS1:11:5.1 Explain that the Earth is composed of interactive layers, which have distinct compositions, physical properties and processes.	Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Plate Tectonics
Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust			The Major Paradigm Shift	
S:ESS1:11:5.2 Relate plate movement to earthquakes and volcanic activity, and explain how it results in tectonic uplift and mountain building.			Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Earthquake Activity
			Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Volcanism
			Plate Tectonics,	Mountain Building

			Volcanoes, Earthquakes, and Deformation of Earth's Crust	
		S:ESS1:11:5.3 Identify and describe the major external and internal sources of energy on Earth.	Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	What drives the Plates?
		S:ESS1:11:5.4 Provide supporting geologic/geographic evidence that supports the validity of the theory of plate tectonics.	Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Ocean Floor Mapping
			Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Volcanism
			Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Earthquakes
			Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Deformation
		S:ESS1:11:5.5 Trace the development of the theory of plate tectonics.	Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Continental Drift –In search of a theory



			Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Developing the theory
			Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Ocean floor mapping
			Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Magnetic striping and polar reversals
			Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Seafloor spreading
			Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	Earthquake activity
		S:ESS1:11:5.6 Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading).	Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	What drives the Plates?
	S:ESS1:11.6 Rock Cycle	S:ESS1:11:6.1 Explain that throughout the rock cycle, the total amount of the	Minerals, Rocks, and the Rock Cycle	The Rock Cycle

		material remains the same.		
	S:ESS1:11.7 Water	S:ESS1:11:7.1 Explain that water quality can be affected positively or negatively by outside sources.		
	S:ESS2:11 The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.			
	S:ESS2:11.1 Earth, Sun, and Moon	S:ESS2:11:1.1 Explain how the Earth, Moon and Sun were formed.	Astronomy	The Earth, Moon and Sun
	S:ESS2:11.2 Energy	S:ESS2:11:2.1 Identify the Earth's major external source of energy as solar energy.	Astronomy	Heating the Atmosphere
		S:ESS2:11:2.2 Explain how the inclination of incoming solar radiation can impact the amount of energy Earth receives on any given surface area.	Astronomy	The Earth, Moon and Sun
		S:ESS2:11:2.3 Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading).	Plate Tectonics, Volcanoes, Earthquakes, and Deformation of Earth's Crust	What drives the Plates?
	S:ESS2:11.3 Solar System	S:ESS2:11:3.1 Explain how gravitational force influenced the formations of the planets and their moons; and describe how these objects move in patterns under its continued influence.	Astronomy	The Earth, Moon and Sun
			Astronomy	The birth of a Star
			Astronomy	The solar system
		S:ESS2:11:3.2 Explain how the Solar System formed from a giant cloud of gas and debris about 5 billion years ago.	Astronomy	The Earth, Moon and Sun
			Astronomy	The birth of a Star
			Astronomy	The solar system
	S:ESS2:11.4 View from Earth	None at this grade span.		
	S:ESS3:11 The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast	S:ESS3:11:1.1 Recognize electromagnetic waves can be used to locate objects in the universe, and track their movement.	Astronomy	The Universe

	distances and time. S:ESS3:11.1 Size and Scale	S:ESS3:11:1.2 Define a light year.	Astronomy	Astronomical Distances
	S:ESS3:11.2 Stars and Galaxies	S:ESS3:11:2.1 Identify and describe the characteristics common to most stars in the universe.	Astronomy	The Birth of a Star
		S:ESS3:11:2.2 Describe the ongoing processes involved in star formation, their life cycles and their destruction.	Astronomy	The Birth of a Star
		S:ESS3:11:2.3 Explain the relationships between or among the energy produced from nuclear reactions, the origin of elements, and the life cycles of stars.	Astronomy	The Birth of a Star
	S:ESS3:11.3 Universe	S:ESS3:11:3.1 Explain that current scientific evidence supports the Big Bang Theory as a probable explanation of the origin of the universe, and describe the theory.	Astronomy	The Universe
		S:ESS3:11:3.2 Explain the evidence that suggests the universe is expanding.	Astronomy	The Big Bang
		S:ESS3:11:3.3 Provide scientific evidence that supports or refutes the "Big Bang" theory of how the universe was formed.		
		S:ESS3:11:3.4 Based on the nature of electromagnetic waves, explain the movement and location of objects in the universe or their composition (e.g., red shift, blue shift, line spectra).	Astronomy	The Universe
		S:ESS3:11:3.5 Explain how scientific theories about the structure of the universe have been advanced through the use of sophisticated technology (e.g., space probes and visual, radio and x-ray telescopes).		
	S:ESS4:11 The growth of scientific knowledge in Earth Space Science	S:ESS4:11:1.1 Describe ways in which technology has increased our		

	<p>has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.</p> <p>S:ESS4:11.1 Design Technology</p>	<p>understanding of the universe.</p>		
	<p>S:ESS4:11.2 Tools</p>	<p>S:ESS4:11:1.2 Understand that technology is designed with a particular function in mind; and principles of Earth Space science are useful in creating technology for the Earth space sciences.</p>		
		<p>S:ESS4:11:2.1 Describe the use and benefits of land-based light telescopes, radio telescopes, spectrophotometers, satellites, manned exploration, probes, and robots to the study of Earth Space Science.</p>	<p>Astronomy</p>	<p>Looking into Space</p>
		<p>S:ESS4:11:2.2 Explain how scientists study the Earth using computer-generated models and observations from both landbased sites and satellites; and describe the value of using these tools in unison.</p>		
	<p>S:ESS4:11.3 Local and Global Environmental Issues</p>	<p>ESS4.3.A.S:ESS4:11:3.1 Differentiate between and provide examples of renewable and nonrenewable sources of energy; and explain the advantages and limitations of each.</p>		
		<p>ESS4.3.A.S:ESS4:11:3.2 Describe the means for transforming a natural material, such as iron ore, into useful products during different historical periods, such as the Stone Age, Iron Age, Renaissance, the Industrial Period and the current Age of Information.</p>		
		<p>ESS4.3.B.S:ESS4:11.3.3 Explain how the use of technologies at a local level, such as burning of fossil fuels for transportation or power generation, may contribute to global environmental problems.</p>		



	S:ESS4:11.4 Career Technical Education Connections	S:ESS4:11:4.1 Explain the kinds of applications of knowledge and skills necessary for jobs/careers specific to Earth or space sciences.	Planet Earth	Earth Science Career Paths
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