



# Alignment Document

## State of Arizona And Aventa Learning Earth Science

### Earth Science 2005-2007 Benchmark Blueprint

State Standard Number	State Standard Area / Description	Unit Name	Course Topic Description
1	Inquiry Process		
1.1	Formulate predictions, questions, or hypotheses based on observations. Evaluate appropriate		
1.1.PO 1	Evaluate scientific information for relevance to a given problem.		
1.1.PO 2	Develop questions from observations that transition into testable hypotheses.		
1.1.PO 3	Formulate a testable hypothesis.		
1.1.PO 4	Predict the outcome of an investigation based on prior evidence, probability, and/or modeling (not guessing or inferring).		
1.2	Design and conduct controlled investigations.		
1.2.PO 1	Demonstrate safe and ethical procedures (e.g., use and care of technology, materials, organisms) and behavior in all science inquiry.		
1.2.PO 2	Identify the resources needed to conduct an investigation.		
1.2.PO 3	Design an appropriate protocol (written plan of action) for testing a hypothesis:		
1.2.PO 3.a	Identify dependent and independent variables in a controlled investigation.		

1.2.PO 3.b	Determine an appropriate method for data collection (e.g., using balances, thermometers, microscopes, spectrophotometer, using qualitative changes).		
1.2.PO 3.c	Determine an appropriate method for recording data (e.g., notes, sketches, photographs, videos, journals (logs), charts, computers/calculators).		
1.2.PO 4	Conduct a scientific investigation that is based on a research design.		
1.2.PO 5	Record observations, notes, sketches, questions, and ideas using tools such as journals, charts, graphs, and computers.		
1.3	Evaluate experimental design, analyze data to explain results and to propose further investigations. Design models.		
1.3.PO 1	Interpret data that show a variety of possible relationships between variables, including:		
1.3.PO 1.a	positive relationship		
1.3.PO 1.b	negative relationship		
1.3.PO 1.c	no relationship		
1.3.PO 2	Evaluate whether investigational data support or do not support the proposed hypothesis.		
1.3.PO 3	Critique reports of scientific studies (e.g., published papers, student reports).		
1.3.PO 4	Evaluate the design of an investigation to identify possible sources of procedural error, including:		
1.3.PO 4.a	sample size		
1.3.PO 4.b	trials		
1.3.PO 4.c	controls		
1.3.PO 4.d	analyses		
1.3.PO 5	Design models (conceptual or physical) of the following to represent "real world" scenarios:		
1.3.PO 5.a	carbon cycle		
1.3.PO 5.b	water cycle		
1.3.PO 5.d	collisions		

1.3.PO 6	Use descriptive statistics to analyze data, including:		
1.3.PO 6.a	mean		
1.3.PO 6.b	frequency		
1.3.PO 6.c	range		
1.3.PO 7	Propose further investigations based on the findings of a conducted investigation.		
1.4	Communicate results of investigations.		
1.4.PO 1	For a specific investigation, choose an appropriate method for communicating the results.		
1.4.PO 2	Produce graphs that communicate data.		
1.4.PO 3	Communicate results clearly and logically.		
1.4.PO 4	Support conclusions with logical scientific arguments.		
2	History and Nature of Science		
2.1	Identify individual, cultural, and technological contributions to scientific knowledge.		
2.1.PO 1	Describe how human curiosity and needs have influenced science, impacting the quality of life worldwide.	Planet Earth	Astronomy
2.1.PO 2	Describe how diverse people and/or cultures, past and present, have made important contributions to scientific innovations.	Planet Earth	Astronomy
2.1.PO 3	Analyze how specific changes in science have affected society.		
2.1.PO 4	Analyze how specific cultural and/or societal issues promote or hinder scientific advancements.		
2.2	Understand how scientists evaluate and extend scientific knowledge.		
2.2.PO 1	Specify the requirements of a valid, scientific explanation (theory), including that it be:		
2.2.PO 1.a	logical		
2.2.PO 1.b	subject to peer review		
2.2.PO 1.c	public		
2.2.PO 1.d	respectful of rules of evidence		

2.2.PO 2	Explain the process by which accepted ideas are challenged or extended by scientific innovation.		
2.2.PO 3	Distinguish between pure and applied science.		
2.2.PO 4	Describe how scientists continue to investigate and critically analyze aspects of theories.		
3	Science in Personal and Social Perspectives		
3.1	Describe the interactions between human populations, natural hazards, and the environment.		
3.1.PO 1	Evaluate how the processes of natural ecosystems affect, and are affected by, humans.		
3.1.PO 2	Describe the environmental effects of the following natural and/or human-caused hazards:		
3.1.PO 2.a	flooding		
3.1.PO 2.b	drought		
3.1.PO 2.c	earthquakes	Plate Tectonics, Volcanoes, Earthquakes, and Deformation	Earthquakes
3.1.PO 2.d	fires		
3.1.PO 2.e	pollution		
3.1.PO 2.f	extreme weather		
3.1.PO 3	Assess how human activities (e.g., clear cutting, water management, tree thinning) can affect the potential for hazards.		
3.1.PO 4	Evaluate the following factors that affect the quality of the environment:		
3.1.PO 4.a	urban development		
3.1.PO 4.b	smoke		
3.1.PO 4.c	volcanic dust	Plate Tectonics, Volcanoes, Earthquakes, and Deformation	Volcanism
3.1.PO 5	Evaluate the effectiveness of conservation practices and preservation techniques on environmental quality and biodiversity.		

3.2	Develop viable solutions to a need or problem.		
3.2.PO 1	Analyze the costs, benefits, and risks of various ways of dealing with the following needs or problems:		
3.2.PO 1.a	various forms of alternative energy		
3.2.PO 1.b	storage of nuclear waste		
3.2.PO 1.c	abandoned mines		
3.2.PO 1.d	greenhouse gases		
3.2.PO 1.e	hazardous wastes		
3.2.PO 2	Recognize the importance of basing arguments on a thorough understanding of the core concepts and principles of science and technology.		
3.2.PO 3	Support a position on a science or technology issue.		
3.2.PO 4	Analyze the use of renewable and nonrenewable resources in Arizona:		
3.2.PO 4.a	water		
3.2.PO 4.b	land		
3.2.PO 4.c	soil		
3.2.PO 4.d	minerals		
3.2.PO 4.e	air		
3.2.PO 5	Evaluate methods used to manage natural resources (e.g., reintroduction of wildlife, fire ecology).		
3.3	Analyze factors that affect human populations.		
3.3.PO 1	Analyze social factors that limit the growth of a human population, including:		
3.3.PO 1.a	affluence		
3.3.PO 1.b	education		
3.3.PO 1.c	access to health care		
3.3.PO 1.d	cultural influences		
3.3.PO 2	Describe biotic (living) and abiotic (nonliving) factors that affect human populations.		
3.3.PO 3	Predict the effect of a change in a specific factor on a human population.		

6	Earth and Space Science		
6.1	Analyze the interactions between the Earth's structures, atmosphere, and geochemical cycles.		
6.1.PO 1	Identify ways materials are cycled within the earth system (i.e., carbon cycle, water cycle, rock cycle).	Planet Earth	Earth as a Complex System
6.1.PO 2	Demonstrate how dynamic processes such as weathering, erosion, sedimentation, metamorphism, and orogenesis relate to redistribution of materials within the earth system.	Planet Earth	Earth as a Complex System
		Weathering, Erosion, and Deposition	Erosion, Deposition and Landscape Development
6.1.PO 3	Explain how the rock cycle is related to plate tectonics.	Minerals, Rocks and the Rock Cycle	The Rock Cycle
6.1.PO 4	Demonstrate how the hydrosphere links the biosphere, lithosphere, cryosphere, and atmosphere.	Planet Earth	Earth as a Complex System
6.1.PO 5	Describe factors that impact current and future water quantity and quality including surface, ground, and local water issues.		
6.1.PO 6	Analyze methods of reclamation and conservation of water.		
6.1.PO 7	Explain how the geochemical processes are responsible for the concentration of economically valuable minerals and ores in Arizona and worldwide.		
6.2	Understand the relationships between the Earth's land masses, oceans, and atmosphere.		
6.2.PO 1	Describe the flow of energy to and from the Earth.	Planet Earth	Earth as a Complex System
6.2.PO 2	Explain the mechanisms of heat transfer (convection, conduction, radiation) among the atmosphere, land masses, and oceans.	Changes in the Atmosphere	Heating the Atmosphere
6.2.PO 3	Distinguish between weather and climate.		



6.2.PO 4	Demonstrate the relationship between the Earth's internal convective heat flow and plate tectonics.	Plate Tectonics, Volcanoes, Earthquakes and Deformation	Internal Structure of the Earth
6.2.PO 5	Demonstrate the relationships among earthquakes, volcanoes, mountain ranges, mid-oceanic ridges, deep sea trenches, and tectonic plates.	Plate Tectonics, Volcanoes, Earthquakes and Deformation	Internal Structure of the Earth
6.2.PO 6	Distinguish among seismic S, P, and surface waves.	Plate Tectonics, Volcanoes, Earthquakes and Deformation	Earthquakes
6.2.PO 7	Analyze the seismic evidence (S and P waves) used to determine the structure of the Earth.		
6.2.PO 8	Describe how radioactive decay maintains the Earth's internal temperature.		
6.2.PO 9	Explain the effect of heat transfer on climate and weather.	Changes in the Atmosphere	Heating the Atmosphere
6.2.PO 10	Demonstrate the effect of the Earth's rotation (i.e., Coriolis effect) on the movement of water and air.	Changes in the Atmosphere	Wind
6.2.PO 11	Describe the origin, life cycle, and behavior of weather systems (i.e., air mass, front, high and low systems, pressure gradients).	Changes in the Atmosphere	Weather and Forecasting
6.2.PO 12	Describe the conditions that cause severe weather (e.g., hurricanes, tornadoes, thunderstorms).	Changes in the Atmosphere	Weather and Forecasting
6.2.PO 13	Propose appropriate safety measures that can be taken in preparation for severe weather.		
6.2.PO 14	Analyze how weather is influenced by both natural and artificial earth features (e.g., mountain ranges, bodies of water, cities, air pollution).		
6.2.PO 15	List the factors that determine climate (e.g., altitude, latitude, water bodies, precipitation, prevailing winds, topography).		
6.2.PO 16	Explain the causes and/or effects of climate changes over long periods of time (e.g., glaciation, desertification, solar activity, greenhouse effect).		

6.2.PO 17	Investigate the effects of acid rain, smoke, volcanic dust, urban development, and greenhouse gases, on climate change over various periods of time.		
6.3	Analyze the factors used to explain the history and evolution of the Earth.		
6.3.PO 1	Describe the scientific theory of the origin of the solar system (solar nebular hypothesis).	Earth and Space	Earth and the Moon
6.3.PO 2	Describe the characteristics, location, and motions of the various kinds of objects in our solar system, including the Sun, planets, satellites, comets, meteors, and asteroids.	Earth and Space	The Solar System and the Universe
6.3.PO 3	Explain the phases of the Moon, eclipses (lunar and solar), and the interaction of the Sun, Moon, and Earth (tidal effect).	Earth and Space	Earth and the Moon
6.3.PO 4	Interpret a geologic time scale.	The History of the Earth and Atmosphere	The History of the Atmosphere
6.3.PO 5	Distinguish between relative and absolute geologic dating techniques.	The History of the Earth and Atmosphere	The History of the Atmosphere
6.3.PO 6	Investigate scientific theories of how life originated on Earth (high temperature, low oxygen, clay catalyst model).		
6.3.PO 7	Describe how life on Earth has influenced the evolution of the Earth's systems.		
6.3.PO 8	Sequence major events in the Earth's evolution (e.g., mass extinctions, glacial episodes) using relative and absolute dating data.		
6.3.PO 9	Analyze patterns in the fossil record related to the theory of organic evolution.		



6.4	Analyze the factors used to explain the origin and evolution of the universe.		
6.4.PO 1	Describe the Big Bang Theory as an explanation for the origin of the universe.	Earth and Space	The Solar System and the Universe
6.4.PO 2	Describe the fusion process that takes place in stars.		
6.4.PO 3	Analyze the evolution of various types of stars using the Hertzsprung-Russell (HR) diagram.		
6.4.PO 4	Compare the evolution (life cycles) of stars of different masses (low and high mass).	Earth and Space	The Solar System and the Universe
6.4.PO 5	Explain the formation of the light elements in stars and the heavier elements (what astronomers call "metals") in supernova explosions.		
6.4.PO 6	Explain the evolution and life cycles of galaxies.		