AVENTA LEARNING

Alignment Document
State of Indiana and Aventa Learning Earth Science

Earth Science
2005-2007 Benchmark Blueprint

Standards	Benchmarks	Unit Name	Course Topic Description
ES.1 Science Students investigate, through laboratory and fieldwork, the universe, Earth, and the processes that shape Earth. They understand that Earth operates as a collection of interconnected systems that may be changing or may be in equilibrium. Students connect the concepts of energy, matter, conservation, and gravitation to Earth, the solar system, and the universe. Students utilize knowledge of the materials and processes of Earth, planets, and stars in the context of the scales of time and size.	**ES.1.1** Understand and discuss the nebular theory concerning the formation of solar systems. Include in the discussion the roles of planetesimals and protoplanets.	Astronomy	Birth of a Star
	ES.1.2 Differentiate between the different types of stars found on the Hertzsprung-Russell Diagram. Compare and contrast the evolution of stars of different masses. Understand and discuss the basics of the fusion processes that are the source of energy of stars.	Astronomy Astronomy	The Earth, Sun, and Moon Birth of a Star
	ES.1.3 Compare and contrast the differences in size, temperature, and age between our sun and other stars.	Astronomy Astronomy	The Earth, Sun, and Moon Birth of a Star
	ES.1.4 Describe Hubble's law. Identify and understand that the "Big Bang" theory is the most widely accepted theory explaining the formation of the universe.	Astronomy	The Universe
	ES.1.5 Understand and explain the relationship between planetary systems, stars, multiple-star systems, star clusters, galaxies, and galactic groups in the universe.	Astronomy	The Solar System
	ES.1.6 Discuss how manned and unmanned space vehicles can be used to increase our knowledge and understanding of the universe.	Astronomy Astronomy	Looking into Space Space Exploration

	ES.1.7 Describe the characteristics and motions of the various kinds of objects in our solar system, including planets, satellites, comets, and asteroids. Explain that Kepler's laws determine the orbits of the planets.	X GAP	X GAP
	ES.1.8 Discuss the role of sophisticated technology, such as telescopes, computers, space probes, and particle accelerators, in making computer simulations and mathematical models in order to form a scientific account of the universe.	Astronomy Astronomy Astronomy	Looking into Space The Universe Space Exploration
	ES.1.9 Recognize and explain that the concept of conservation of energy is at the heart of advances in fields as diverse as the study of nuclear particles and the study of the origin of the universe.	Plant Earth	Energy and Mass Transfer
	ES.1.10 Recognize and describe that the earth sciences address planet-wide interacting systems, including the oceans, the air, the solid earth, and life on Earth, as well as interactions with the Solar System.	Planet Earth Planet Earth	What is Earth Science? Earth as a Complex System
	ES.1.11 Examine the structure, composition, and function of Earth's atmosphere. Include the role of living organisms in the cycling of atmospheric gases.	Atmosphere and Climate Atmosphere and Climate Atmosphere and Climate Atmosphere and Climate Atmosphere and Climate Atmosphere and Climate Atmosphere and Climate Atmosphere and Climate	Structure of the Atmosphere Origin of the Earth’s Atmosphere Pressure Heat is Energy Measuring Pressure Heating the Atmosphere The Greenhouse Effect Heat and Energy

	ES.1.12 Describe the role of photosynthetic plants in changing Earth's atmosphere.	Atmosphere and Climate	Structure of the Atmosphere
	ES.1.13 Explain the importance of heat transfer between and within the atmosphere, land masses, and oceans.	Atmosphere and Climate	Heat and the Atmosphere
	ES.1.14 Understand and explain the role of differential heating and the role of Earth's rotation on the movement of air around the planet.	Atmosphere and Climate World of Weather	Heat and Energy Wind
	ES.1.15 Understand and describe the origin, life cycle, behavior, and prediction of weather systems.	World of Weather World of Weather World of Weather	Wind Moisture Weather and Forecasting
	ES.1.16 Investigate the causes of severe weather, and propose appropriate safety measures that can be taken in the event of severe weather.	World of Weather	Wind
	ES.1.17 Describe the development and dynamics of climatic changes over time, such as the cycles of glaciation.	Weathering, Erosion, and Deposition; Glaciers and Deserts	Glaciers-Formation and Growth
	ES.1.18 Demonstrate the possible effects of atmospheric changes brought on by things such as acid rain, smoke, volcanic dust, greenhouse gases, and ozone depletion.	Atmosphere and Climate	The Greenhouse Effect
	ES.1.19 Identify and discuss the effects of gravity on the waters of Earth. Include both the flow of streams and the movement of tides.	Weathering and Erosion, and Deposition; Glaciers and Deserts Weathering and Erosion, and Deposition; Glaciers and Deserts Weathering and Erosion, and Deposition; Glaciers and Deserts	Wind Moisture Weather and Forecasting

	ES.1.20 Describe the relationship among ground water, surface water, and glacial systems.	Weathering, Erosion, and Deposition; Glaciers and Deserts Weathering, Erosion, and Deposition; Glaciers and Deserts Weathering, Erosion, and Deposition; Glaciers and Deserts	Glacial Flow Glacial Landscapes The Pleistocene Glaciation
	ES.1.21 Identify the various processes that are involved in the water cycle.	X GAP	X GAP
	ES.1.22 Compare the properties of rocks and minerals and their uses.	Minerals, Rocks, and the Rock Cycle Minerals, Rocks, and the Rock Cycle Minerals, Rocks, and the Rock Cycle Minerals, Rocks, and the Rock Cycle Minerals, Rocks, and the Rock Cycle Minerals, Rocks, and the Rock Cycle Minerals, Rocks, and the Rock Cycle	Minerals, Rocks, and the Rock Cycle Basic Chemistry and Atomic Structure of Matter Chemical Reactions and Atomic Structures of Minerals Identifying Minerals Earth’s Rock Forming Minerals Earth’s Rocks The Rock Cycle
	ES.1.23 Explain motions, transformations, and locations of materials in Earth's lithosphere and interior. For example, describe the movement of the plates that	Plate Tectonics, Volcanoes, and Earthquakes	Continental Drift-In Search of A Theory

	make up the crust of the earth and the resulting formation of earthquakes, volcanoes, trenches, and mountains.	Plate Tectonics, Volcanoes, and Earthquakes	Developing a Theory
		Plate Tectonics, Volcanoes, and Earthquakes	Ocean floor Mapping
		Plate Tectonics, Volcanoes, and Earthquakes	Magnetic Striping and Polar Reversals
		Plate Tectonics, Volcanoes, and Earthquakes	Seafloor Spreading
		Plate Tectonics, Volcanoes, and Earthquakes	Earthquake Activity
		Plate Tectonics, Volcanoes, and Earthquakes	Convergent Boundaries
		Plate Tectonics, Volcanoes, and Earthquakes	Divergent Boundaries
		Plate Tectonics, Volcanoes, and Earthquakes	Transform Boundaries
		Plate Tectonics, Volcanoes, and Earthquakes	Plate Boundary Zones
		Plate Tectonics,	Rates of Plate Motion

		Volcanoes, and Earthquakes	
		Plate Tectonics, Volcanoes, and Earthquakes	Hot spots
		Plate Tectonics, Volcanoes, and Earthquakes	Volcanism
		Plate Tectonics, Volcanoes, and Earthquakes	Earthquakes
		Plate Tectonics, Volcanoes, and Earthquakes	Deformation
		Plate Tectonics, Volcanoes, and Earthquakes	Strike and Dip
		Plate Tectonics, Volcanoes, and Earthquakes	Folds
		Plate Tectonics, Volcanoes, and Earthquakes	Faults
		Plate Tectonics, Volcanoes, and Earthquakes	Mountain Building
	ES.1.24 Understand and discuss continental drift, sea-floor spreading, and plate tectonics. Include evidence that supports the movement	Plate Tectonics, Volcanoes, and Earthquakes	Continental Drift

	of the plates, such as magnetic stripes on the ocean floor, fossil evidence on separate continents, and the continuity of geological features.	Plate Tectonics, Volcanoes, and Earthquakes	Developing a Theory
		Plate Tectonics, Volcanoes, and Earthquakes	Ocean Floor Mapping
		Plate Tectonics, Volcanoes, and Earthquakes	Magnetic Striping and Polar Reversals
		Plate Tectonics, Volcanoes, and Earthquakes	Sea Floor Spreading
		Plate Tectonics, Volcanoes, and Earthquakes	Earthquake Activity
	ES.1.25 Investigate and discuss the origin of various landforms, such as mountains and rivers, and how they affect and are affected by human activities.	Weathering and Erosion, and Deposition; Glaciers and Deserts	Glacial Flow
		Weathering and Erosion, and Deposition; Glaciers and Deserts	Glacial Landscapes
		Weathering and Erosion, and Deposition; Glaciers and Deserts	The Pleistocene Glaciation
		Plate Tectonics, Volcanoes, and Earthquakes	Plate Tectonics, Volcanoes, and Earthquakes
	ES.1.26 Differentiate among the processes of weathering, erosion, transportation of	Weathering and Erosion, and Deposition; Glaciers	Glacial Flow

	materials, deposition, and soil formation.	and Deserts Weathering and Erosion, and Deposition; Glaciers and Deserts Weathering and Erosion, and Deposition; Glaciers and Deserts	 Glacial Landscapes The Pleistocene Glaciation
	ES.1.27 Illustrate the various processes that are involved in the rock cycle and discuss how the total amount of material stays the same through formation, weathering, sedimentation, and reformation.	Weathering and Erosion, and Deposition; Glaciers and Deserts Minerals, Rocks, and The Rock Cycle	Weathering and Erosion The Rock Cycle
	ES.1.28 Discuss geologic evidence, including fossils and radioactive dating, in relation to Earth's past.	Geologic Time Geologic Time Geologic Time Geologic Time Geologic Time Geologic Time Geologic Time Geologic Time	Geologic Time Scale Relative Time Scale Rocks and Layers Fossils and Rocks Numerical Time Scale Radiometric Dating and Radiometric Age Determination Dated Materials Age of the Earth
	ES.1.29 Recognize and explain that in geologic change, the present arises from the materials of the past in ways that can be explained according to the same physical and chemical laws.	Minerals, Rocks, and The Rock Cycle Weathering and Erosion, and Deposition; Glaciers and Deserts	The Rock Cycle Glacial Flow

		Weathering and Erosion, and Deposition; Glaciers and Deserts Weathering and Erosion, and Deposition; Glaciers and Deserts	Glacial Landscapes The Pleistocene Glaciation
ES.2 Students gain understanding of how the scientific enterprise operates through examples of historical events. Through the study of these events, they understand that new ideas are limited by the context in which they are conceived, are often rejected by the scientific establishment, sometimes spring from unexpected findings, and grow or transform slowly through the contributions of many different investigators.	**ES.2.1** Understand and explain that Claudius Ptolemy, an astronomer living in the second century, devised a powerful mathematical model of the universe based on constant motion in perfect circles and circles on circles. Further understand that with the model, he was able to predict the motions of the sun, moon, and stars, and even of the irregular "wandering stars" now called planets.	The Planet Earth	Pioneers in Greek Astronomy
	ES.2.2 Understand that and describe how in the sixteenth century the Polish astronomer Nicholas Copernicus suggested that all those same motions outlined by Ptolemy could be explained by imagining that Earth was turning on its axis once a day and orbiting around the sun once a year. Note that this explanation was rejected by nearly everyone because it violated common sense and required the universe to be unbelievably large. Also understand that Copernicus's ideas flew in the face of belief, universally held at the time, that Earth was at the center of the universe.	The Planet Earth Astronomy	Other Pioneers in Astronomy The Earth, Moon and Sun
	ES.2.3 Understand that and describe how Johannes Kepler, a German astronomer who lived at about the same time as Galileo, used the unprecedented precise observational data of the Danish astronomer Tycho Brahe. Know that Kepler showed mathematically that Copernicus's idea of a sun-centered system	The Planet Earth Astronomy	Other Pioneers in Astronomy The Earth, Moon and Sun

	worked better than any other system if uniform circular motion was replaced with variable-speed, but predictable, motion along off-center ellipses.		
	ES.2.4 Explain that by using the newly invented telescope to study the sky, Galileo made many discoveries that supported the ideas of Copernicus. Recognize that it was Galileo who found the moons of Jupiter, sunspots, craters and mountains on the moon, the phases of Venus, and many more stars than were visible to the unaided eye.	The Planet Earth Astronomy	Other Pioneers in Astronomy The Earth, Moon and Sun
	ES.2.5 Explain that the idea that Earth might be vastly older than most people believed made little headway in science until the work of Lyell and Hutton.	The Planet Earth	Early Geologists and Geology
	ES.2.6 Describe that early in the twentieth century the German scientist Alfred Wegener reintroduced the idea of moving continents, adding such evidence as the underwater shapes of the continents, the similarity of life forms and land forms in corresponding parts of Africa and South America, and the increasing separation of Greenland and Europe. Also know that very few contemporary scientists adopted his theory because Wegener was unable to propose a plausible mechanism for motion.	The Planet Earth Plate Tectonics, Volcanoes, and Earthquakes	Early Geologist and Geology Continental Drift- In Search of a Theory
	ES.2.7 Explain that the theory of plate tectonics was finally accepted by the scientific community in the 1960s when further evidence had accumulated in support of it. Understand that the theory was seen to provide an explanation for a diverse array of seemingly unrelated phenomena and there was a scientifically sound physical explanation	Plate Tectonics, Volcanoes, and Earthquakes	Continental Drift- In Search of a Theory

	of how such movement could occur.		