

GEORGIA SCIENCE STANDARDS Grades 9–12

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Contents Standards Mapping

Earth Systems	Boardworks High School Earth Science Presentation
SES1: Students will investigate the composition and formation of Earth systems, including the Earth's relationship to the solar system.	
a. Describe the early evolution of the Earth and solar system, including the formation of Earth's solid layers (core, mantle, crust), the distribution of major elements, the origin of internal heat sources, and the mechanism by which heat transfer drives plate tectonics.	Planets of the Solar System Plate Tectonics Earth's Structure
b. Explain how the composition of the Earth's crust, mantle and core is determined and compare it to that of other solar system objects.	Earth's Structure Planets of the Solar System
c. Describe how the decay of radioactive isotopes is used to determine the age of rocks, Earth, and solar system.	Planets of the Solar System Radioactive Dating
d. Describe how the Earth acquired its initial oceans and atmosphere.	The Atmosphere Planets of the Solar System
e. Identify the transformations and major reservoirs that make up the rock cycle, hydrologic cycle, carbon cycle, and other important geochemical cycles.	The Carbon Cycle Formation of Fossil Fuels The Nitrogen Cycle The Rock Cycle The Water Cycle
SES2: Students will understand how plate tectonics creates certain geologic features, materials, and hazards.	
a. Distinguish among types of plate tectonic settings produced by plates diverging, converging, and sliding past each other.	Earthquake Causes Plate Tectonics
b. Relate modern and ancient geologic features to each kind of plate tectonic setting.	Plate Tectonics
c. Relate certain geologic hazards to specific plate tectonic settings.	Plate Tectonics Earthquake Causes Earthquake Effects Managing Earthquakes Volcanoes
d. Associate specific plate tectonic settings with the production of particular groups of igneous and metamorphic rocks and mineral resources.	The Rock Cycle Plate Tectonics

e. Explain how plate tectonics creates and destroys sedimentary basins through time.	Plate Tectonics
SES3. Students will explore the actions of water, wind, ice, and gravity that create landforms and systems of landforms (landscapes).	
a. Describe how surface water and groundwater act as the major agents of physical and chemical weathering.	Weathering
b. Explain how soil results from weathering and biological processes acting on parent rock.	Soil
c. Describe the processes and hazards associated with both sudden and gradual mass wasting.	Coastal Processes
d. Relate the past and present actions of ice, wind, and water to landform distribution and landscape evolution.	Coastal Erosional Landforms Coastal Depositional Landforms Erosion, Transportation and Deposition Weathering
e. Explain the processes that transport and deposit material in terrestrial and marine sedimentary basins, which result, over time, in sedimentary rock.	The Rock Cycle Erosion, Transportation and Deposition
SES4. Students will understand how rock relationships and fossils are used to reconstruct the Earth's past.	
a. Describe and apply principles of relative age (superposition, original horizontality, cross-cutting relations, and original lateral continuity) and describe how unconformities form.	–
b. Interpret the geologic history of a succession of rocks and unconformities.	–
c. Apply the principle of uniformitarianism to relate sedimentary rock associations and their fossils to the environments in which the rocks were deposited.	–
d. Explain how sedimentary rock units are correlated within and across regions by a variety of methods (e.g., geologic map relationships, the principle of fossil succession, radiometric dating, and paleomagnetism).	Fossil Record Radioactive Dating
e. Use geologic maps and stratigraphic relationships to interpret major events in Earth history (e.g., mass extinction, major climatic change, tectonic events).	–
SES5. Students will investigate the interaction of insolation and Earth systems to produce weather and climate.	
a. Explain how latitudinal variations in solar heating create atmospheric and ocean currents that redistribute heat globally.	Heat Transfer and Global Interactions The Rotation of the Earth
b. Explain the relationship between air masses and the surfaces over which they form.	Heat Transfer and Global Interactions
c. Relate weather patterns to interactions among ocean currents, air masses, and topography.	Weather and Climate
d. Describe how temperature and precipitation produce the pattern of climate regions (classes) on Earth.	Weather and Climate Precipitation
e. Describe the hazards associated with extreme weather events and climate change (e.g., hurricanes, tornadoes, El Niño/La Niña, global warming).	Climate Change ENSO Extreme Flooding Hurricane Case Studies River Flooding Tropical Cyclones

f. Relate changes in global climate to variation in Earth/Sun relationships and to natural and anthropogenic modification of atmospheric composition.	Air Pollution Climate Change Greenhouse Gases Evidence for Climate Change Human Impact on the Environment
SES6. Students will explain how life on Earth responds to and shapes Earth systems.	
<i>a. Relate the nature and distribution of life on Earth, including humans, to the chemistry and availability of water.</i>	–
<i>b. Relate the distribution of biomes (terrestrial, freshwater, and marine) to climate regions through time.</i>	–
c. Explain how geological and ecological processes interact through time to cycle matter and energy, and how human activity alters the rates of these processes (e.g., fossil fuel formation and combustion).	Human Impact on the Environment Fossil Fuels Climate Change Recycling Nutrients The Carbon Cycle The Nitrogen Cycle
d. Describe how fossils provide a record of shared ancestry, evolution, and extinction that is best explained by the mechanism of natural selection.	Fossil Record
e. Identify the evolutionary innovations that most profoundly shaped Earth systems: photosynthetic prokaryotes and the atmosphere; multicellular animals and marine environments; land plants and terrestrial environments.	The Atmosphere