

**OHIO SCIENCE STANDARDS**  
Content Standards Mapping

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<b>Earth and Space Science</b>	<b>Boardworks High School Earth Science Presentations</b>
<b>Grade 9</b>	
<b>The Universe</b>	
1. Describe that stars produce energy from nuclear reactions and that processes in stars have led to the formation of all elements beyond hydrogen and helium.	The Life Cycle of Stars Properties of Stars
2. Describe the current scientific evidence that supports the theory of the explosive expansion of the universe, the Big Bang, over 10 billion years ago.	Doppler Effect Observing the Universe
3. Explain that gravitational forces govern the characteristics and movement patterns of the planets, comets and asteroids in the solar system.	Gravity and Orbits Structure of the Universe
<b>Earth Systems</b>	
4. Explain the relationships of the oceans to the lithosphere and atmosphere (e.g. transfer of energy, ocean currents and landforms).	Heat Transfer and Global Interactions
<b>Processes that shape earth</b>	
5. Explain how the slow movement of material within Earth results from:	
a. Thermal energy transfer (conduction and convection) from the deep interior;	Earth's Structure Plate Tectonics
b. <i>The action of gravitational forces on regions of different density.</i>	–
6. Explain the results of plate tectonic activity (e.g. magma generation, igneous intrusion, metamorphism, volcanic action, earthquakes, faulting and folding).	Earthquake Causes Plate Tectonics The Rock Cycle Volcanoes
7. Explain sea-floor spreading and continental drift using scientific evidence (e.g. fossil distributions, magnetic reversals and radiometric dating).	Plate Tectonics
<b>Historical Perspectives and Scientific Revolutions</b>	
8. Use historical examples to explain how new ideas are limited by the context in which they are conceived; are often initially rejected by the scientific establishment; sometimes spring from unexpected findings; and usually grow slowly through contributions from many different investigators (e.g. heliocentric theory and plate tectonics)	Plate Tectonics
<b>Grade 10</b>	
<b>Earth Systems</b>	
1. Summarize the relationship between the climatic zone and the resultant biomes. (This includes explaining the nature of the rainfall and temperature of the mid-latitude climatic zone that supports the deciduous forest.)	Heat Transfer and Global Interactions Weather and Climate

2. Explain climate and weather patterns associated with certain geographic locations and features (e.g. tornado alley, tropical hurricanes and lake effect snow).	Weather and Climate Tropical Cyclones Precipitation
3. Explain how geological time can be estimated by multiple methods (e.g. rock sequences, fossil correlation and radiometric dating).	Radioactive Dating Fossil Record
4. Describe how organisms on Earth contributed to the dramatic change in oxygen content of Earth's early atmosphere.	The Atmosphere
5. Explain how the acquisition and use of resources, urban growth and waste disposal can accelerate natural change and impact on quality of life.	Air Pollution Climate Change Greenhouse Gases Human Impact on the Environment The Impact of Mining Fossil Fuels
6. Describe ways that human activity can alter biogeochemical cycles (e.g. carbon and nitrogen cycles) as well as food webs and energy pyramids (e.g. pest control, legume rotation crops vs. chemical fertilizers).	The Carbon Cycle The Nitrogen Cycle Human Impact on the Environment
<b>Historical Perspectives and Scientific Revolutions</b>	
7. Describe advances and issues in Earth and space science that have important long-lasting effects on science and society (e.g. geological time scales, global warming, depletion of resources and exponential population growth).	Air Pollution Human Impact on the Environment Fossil Fuels The Impact of Mining
<b>Grade 11</b>	
<b>The Universe</b>	
1. Describe how the early Earth was different from the planet we live on today, and explain the formation of the sun, Earth and the rest of the solar system from a nebular cloud of dust and gas approximately 4.5 billion years	The Atmosphere Planets of the Solar System
<b>Earth Systems</b>	
2. Analyze how the regular and predictable motions of Earth, sun and moon explain phenomena on Earth (e.g. seasons, tides, eclipses and phases of the moon).	The Moon The Rotation of the Earth
3. Explain heat and energy transfers in and out of the atmosphere and its involvement in weather and climate (radiation, conduction, convection and advection).	Conduction and Convection Heat Transfer and Global Interactions
4. Explain the impact of oceanic and atmospheric currents on weather and climate.	Heat Transfer and Global Interactions Weather and Climate
5. Use appropriate data to analyze and predict upcoming trends in global weather patterns (e.g. el Niño and la Niña, melting glaciers and icecaps and changes in ocean surface temperatures).	ENSO

6. Explain how interactions among Earth's lithosphere, hydrosphere, atmosphere and biosphere have resulted in the ongoing changes of Earth's system.	The Atmosphere The Carbon Cycle The Nitrogen Cycle
7. Describe the effects of particulates and gases in the atmosphere including those originating from volcanic activity.	Air Pollution Fossil Fuels The Atmosphere The Impact of Using CFCs
8. Describe the normal adjustments of Earth, which may be hazardous for humans. Recognize that humans live at the interface between the atmosphere driven by solar energy and the upper mantle where convection creates changes in Earth's solid crust. Realize that as societies have grown, become stable and come to value aspects of the environment, vulnerability to natural processes of change has increased.	Earthquake Causes Earthquake Effects Managing Earthquakes Plate Tectonics
9. Explain the effects of biomass and human activity on climate (e.g. climatic change and global warming).	Air Pollution Climate Change Fossil Fuels The Impact of Using CFCs
<i>10. Interpret weather maps and their symbols to predict changing weather conditions worldwide (e.g. monsoons, hurricanes and cyclones).</i>	-
11. Analyze how materials from human societies (e.g. radioactive waste and air pollution) affect both physical and chemical cycles of Earth.	Air Pollution The Carbon Cycle Climate Change Fossil Fuels Greenhouse Gases Human Impact on the Environment The Impact of Mining The Nitrogen Cycle Water Pollution
12. Explain ways in which humans have had a major effect on other species (e.g. the influence of humans on other organisms occurs through land use, which decreases space available to other species and pollution, which changes the chemical composition of air, soil and water).	Air Pollution Loss of Diversity Human Impact on the Environment The Impact of Mining Water Pollution

13. Explain how human behavior affects the basic processes of natural ecosystems and the quality of the atmosphere, hydrosphere and lithosphere.	Air Pollution Human Impact on the Environment Water Pollution The Impact of Mining The Impact of Using CFCs The Carbon Cycle Climate Change
14. Conclude that Earth has finite resources and explain that humans deplete some resources faster than they can be renewed.	Crude Oil Formation of Fossil Fuels Fossil Fuels
<b>Historical Perspectives and Scientific Revolutions</b>	
15. Use historical examples to show how new ideas are limited by the context in which they are conceived; are often rejected by the social establishment; sometimes spring from unexpected findings; and usually grow slowly through contributions from many different investigators (e.g. global warming, Heliocentric Theory and Theory of Continental Drift).	Climate Change Greenhouse Gases Evidence for Climate Change The Impact of Using CFCs Plate Tectonics
16. Describe advances in Earth and space science that have important long-lasting effects on science and society (e.g. global warming, Heliocentric Theory and Plate Tectonics Theory).	Plate Tectonics The Impact of Using CFCs
<b>Grade 12</b>	
<b>The Universe</b>	
1. Explain how scientists obtain information about the universe by using technology to detect electromagnetic radiation that is emitted, reflected or absorbed by stars and other objects.	Doppler Effect Observing the Universe
2. Explain how the large-scale motion of objects in the universe is governed by gravitational forces and detected by observing electromagnetic radiation.	Gravity and Orbits
3. Explain how information about the universe is inferred by understanding that stars and other objects in space emit, reflect or absorb electromagnetic radiation, which we then detect.	Doppler Effect Observing the Universe
4. Explain how astronomers infer that the whole universe is expanding by understanding how light seen from distant galaxies has longer apparent wavelengths than comparable light sources close to Earth.	Doppler Effect Observing the Universe
<b>Earth Systems</b>	
5. Investigate how thermal energy transfers in the world's oceans impact physical features (e.g. ice caps, oceanic and atmospheric currents) and weather patterns.	Heat Transfer and Global Interactions
6. Describe how scientists estimate how much of a given resource is available on Earth.	–