



Correlations to Learning Standards



U. S. National Standards | High School: Grades 9 – 12

The Layered Earth Lesson Plans

Earth and Space Science, Content Standard D

Energy in the Earth System

Earth systems have internal and external sources of energy, both of which create heat. The sun is the major external source of energy. Two primary sources of internal energy are the decay of radioactive isotopes and the gravitational energy from the Earth's original formation. A1 A2

The outward transfer of Earth's internal heat drives convection circulation on the mantle that propels the plates comprising Earth's surface across the face of the globe. A1 A2 A3 B1 B2 B3

Heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents. A1

Global climate is determined by energy transfer from the sun at and near the Earth's surface. This energy transfer is influenced by dynamic processes such as cloud cover and the Earth's rotation, and static conditions such as the position of mountain ranges and oceans. A1

Geochemical Cycles

The Earth is a system containing essentially a fixed amount of each stable chemical atom or element. Each element can exist in several different reservoirs. Each element on Earth moves among reservoirs in the solid Earth, oceans, atmosphere, and organisms as part of geochemical cycles. A1

Movement of matter between reservoirs is driven by the Earth's internal and external sources of energy. These movements are often accompanied by a change in the physical or chemical properties of the matter. A1 C2 C3 C4

The Origin and Evolution of the Earth System

Geologic time can be estimated by observing rock sequences and using fossils to correlate the sequences at various locations. Current methods include using the known decay rates of radioactive isotopes present in rocks to measure the time since the rock was formed. G1 G2 G3

Interactions among the solid Earth, the oceans, the atmosphere, and organisms have resulted in the ongoing evolution of the Earth system. We can observe some changes such as earthquakes and volcanic eruptions on a human timescale, but many processes such as mountain building and plate movements take place over hundreds of millions of years. A1 B3 C2-C5 D1-D4 E1-E5 F1-F3





The Layered Earth: Correlations to Learning Standards



U. S. National Standards | High School: Grades 9 – 12 *(continued)*

The Layered Earth Lesson Plans

Earth and Space Science, Content Standard D

Structure and Properties of Matter

An element is composed of a single type of atom.

C1

Bonds between atoms are created when electrons are paired up by being transferred or shared. The atoms may be bonded together into molecules or crystalline solids. A compound is formed when two or more kinds of atoms bind together chemically.

C1

The physical properties of compounds reflect the nature of the interactions among its molecules. These interactions are determined by the structure of the molecule, including the constituent atoms and the distances and angles between them.

C1

Interaction of Energy and Matter

Waves, including sound and seismic waves, waves on water, and light waves, have energy and can transfer energy when they interact with matter.

E2 E3 E4





 **U. S. National Science Content Standards | High School: Grades 9 – 12**

The Layered Earth			A – Science as Inquiry	
	Lesson Plan Number	Lesson Plan Title	Abilities necessary to do scientific inquiry	Understandings about scientific inquiry
Unit A	A1	Earth as a System	●	●
The Solid Earth	A2	Earth's Layered Structure	●	●
	A3	Oceans and Continents	●	●
Unit B Plate Tectonics	B1	Continental Drift	●	●
	B2	Seafloor Spreading and Paleomagnetism	●	●
	B3	The Theory of Plate Tectonics	●	●
Unit C Minerals and Rocks	C1	Minerals: Building Blocks of Rocks		●
	C2	The Rock Cycle	●	●
	C3	Igneous, Sedimentary, and Metamorphic Rocks	●	●
	C4	Weathering and Soil Formation	●	●
Unit D Shaping the Earth	D1	Shaping Earth's Surface	●	●
	D2	Mass Movement	●	●
	D3	Water and Ice Landforms	●	●
	D4	Wind Landforms	●	●
Unit E Earthquakes	E1	Earthquakes and Faults	●	●
	E2	Earthquakes and Waves	●	●
	E3	The Strength of Earthquakes	●	●
	E4	Seismic Waves and the Earth's Interior	●	●
	E5	Living with Earthquakes	●	●
Unit F Volcanoes	F1	Formation of Volcanoes	●	●
	F2	Types of Volcanoes	●	●
	F3	Living with Volcanoes	●	●
Unit G Geologic Time	G1	Age of the Earth	●	●
	G2	The Geologic Timescale	●	●
	G3	Catastrophic Events and Mass Extinction	●	●
	G4	Earth's Future	●	●





The Layered Earth: Correlations to Learning Standards



The Layered Earth			B – Physical Science		
	Lesson Plan Number	Lesson Plan Title	Structure and properties of matter	Motions and forces	Interaction of energy and matter
Unit A	A1	Earth as a System			●
The Solid Earth	A2	Earth's Layered Structure			
	A3	Oceans and Continents			
Unit B	B1	Continental Drift		●	
Plate Tectonics	B2	Seafloor Spreading and Paleomagnetism	●		
	B3	The Theory of Plate Tectonics	●	●	●
Unit C	C1	Minerals: Building Blocks of Rocks	●		
Minerals and Rocks	C2	The Rock Cycle	●	●	
	C3	Igneous, Sedimentary, and Metamorphic Rocks	●	●	
	C4	Weathering and Soil Formation	●	●	
Unit D	D1	Shaping Earth's Surface		●	
Shaping the Earth	D2	Mass Movement	●	●	
	D3	Water and Ice Landforms		●	
	D4	Wind Landforms		●	
Unit E	E1	Earthquakes and Faults		●	
Earthquakes	E2	Earthquakes and Waves		●	●
	E3	The Strength of Earthquakes		●	●
	E4	Seismic Waves and the Earth's Interior	●		●
	E5	Living with Earthquakes		●	●
Unit F	F1	Formation of Volcanoes			
Volcanoes	F2	Types of Volcanoes			
	F3	Living with Volcanoes		●	
Unit G	G1	Age of the Earth			
Geologic Time	G2	The Geologic Timescale			
	G3	Catastrophic Events and Mass Extinction		●	●
	G4	Earth's Future			





 **U. S. National Science Content Standards | High School: Grades 9 – 12** *(continued)*

The Layered Earth			D – Earth and Space Science		
	Lesson Plan Number	Lesson Plan Title	Energy in the Earth's system	Geochemical cycles	Origin and evolution of the Earth system
Unit A	A1	Earth as a System	●	●	●
The Solid Earth	A2	Earth's Layered Structure	●		●
	A3	Oceans and Continents	●		●
Unit B	B1	Continental Drift	●		
Plate Tectonics	B2	Seafloor Spreading and Paleomagnetism	●		●
	B3	The Theory of Plate Tectonics	●		●
Unit C	C1	Minerals: Building Blocks of Rocks		●	
Minerals and Rocks	C2	The Rock Cycle	●	●	●
	C3	Igneous, Sedimentary, and Metamorphic Rocks	●	●	●
	C4	Weathering and Soil Formation	●	●	
Unit D	D1	Shaping Earth's Surface	●		
Shaping the Earth	D2	Mass Movement	●	●	
	D3	Water and Ice Landforms	●	●	
	D4	Wind Landforms	●		
Unit E	E1	Earthquakes and Faults	●		
Earthquakes	E2	Earthquakes and Waves	●		
	E3	The Strength of Earthquakes	●		
	E4	Seismic Waves and the Earth's Interior	●		
	E5	Living with Earthquakes	●		
Unit F	F1	Formation of Volcanoes	●		
Volcanoes	F2	Types of Volcanoes			
	F3	Living with Volcanoes	●		
Unit G	G1	Age of the Earth			●
Geologic Time	G2	The Geologic Timescale	●		●
	G3	Catastrophic Events and Mass Extinction	●		●
	G4	Earth's Future	●		●





The Layered Earth: Correlations to Learning Standards

 **U. S. National Science Content Standards | High School: Grades 9 – 12** *(continued)*

The Layered Earth			E – Science and Technology	
	Lesson Plan Number	Lesson Plan Title	Abilities of technological design	Understandings about science and technology
Unit A	A1	Earth as a System		●
The Solid Earth	A2	Earth's Layered Structure		●
	A3	Oceans and Continents		●
Unit B	B1	Continental Drift		●
Plate Tectonics	B2	Seafloor Spreading and Paleomagnetism	●	●
	B3	The Theory of Plate Tectonics	●	●
Unit C	C1	Minerals: Building Blocks of Rocks	●	●
Minerals and Rocks	C2	The Rock Cycle		●
	C3	Igneous, Sedimentary, and Metamorphic Rocks		●
	C4	Weathering and Soil Formation		●
Unit D	D1	Shaping Earth's Surface		●
Shaping the Earth	D2	Mass Movement		●
	D3	Water and Ice Landforms		●
	D4	Wind Landforms		●
Unit E	E1	Earthquakes and Faults	●	●
Earthquakes	E2	Earthquakes and Waves	●	●
	E3	The Strength of Earthquakes	●	●
	E4	Seismic Waves and the Earth's Interior	●	●
	E5	Living with Earthquakes	●	●
Unit F	F1	Formation of Volcanoes	●	●
Volcanoes	F2	Types of Volcanoes	●	●
	F3	Living with Volcanoes	●	●
Unit G	G1	Age of the Earth	●	●
Geologic Time	G2	The Geologic Timescale		●
	G3	Catastrophic Events and Mass Extinction	●	●
	G4	Earth's Future		●





 **U. S. National Science Content Standards | High School: Grades 9 – 12** *(continued)*

The Layered Earth			F – Science in Personal and Social Perspectives			
	Lesson Plan Number	Lesson Plan Title	Natural resources	Environmental quality	Natural and human-induced hazards	Science and technology in local, national, and global challenges
Unit A The Solid Earth	A1	Earth as a System	●			
	A2	Earth's Layered Structure				
	A3	Oceans and Continents				
Unit B Plate Tectonics	B1	Continental Drift				
	B2	Seafloor Spreading and Paleomagnetism				●
	B3	The Theory of Plate Tectonics				●
Unit C Minerals and Rocks	C1	Minerals: Building Blocks of Rocks	●			●
	C2	The Rock Cycle	●			
	C3	Igneous, Sedimentary, and Metamorphic Rocks	●			
	C4	Weathering and Soil Formation	●			●
Unit D Shaping the Earth	D1	Shaping Earth's Surface				
	D2	Mass Movement				
	D3	Water and Ice Landforms				●
	D4	Wind Landforms				
Unit E Earthquakes	E1	Earthquakes and Faults		●	●	●
	E2	Earthquakes and Waves		●	●	●
	E3	The Strength of Earthquakes		●	●	●
	E4	Seismic Waves and the Earth's Interior			●	●
	E5	Living with Earthquakes		●	●	●
Unit F Volcanoes	F1	Formation of Volcanoes			●	●
	F2	Types of Volcanoes		●	●	●
	F3	Living with Volcanoes	●	●	●	●
Unit G Geologic Time	G1	Age of the Earth				
	G2	The Geologic Timescale				
	G3	Catastrophic Events and Mass Extinction		●	●	●
	G4	Earth's Future		●	●	●





The Layered Earth: Correlations to Learning Standards

 **U. S. National Science Content Standards | High School: Grades 9 – 12** *(continued)*

The Layered Earth			G – History and Nature of Science		
	Lesson Plan Number	Lesson Plan Title	Science as a human endeavor	Nature of scientific knowledge	Historical perspectives
Unit A	A1	Earth as a System	●	●	●
The Solid Earth	A2	Earth's Layered Structure	●	●	●
	A3	Oceans and Continents	●	●	●
Unit B	B1	Continental Drift	●	●	●
Plate Tectonics	B2	Seafloor Spreading and Paleomagnetism	●	●	●
	B3	The Theory of Plate Tectonics	●	●	●
Unit C	C1	Minerals: Building Blocks of Rocks	●	●	●
Minerals and Rocks	C2	The Rock Cycle	●	●	●
	C3	Igneous, Sedimentary, and Metamorphic Rocks	●	●	●
	C4	Weathering and Soil Formation	●	●	●
Unit D	D1	Shaping Earth's Surface	●	●	●
Shaping the Earth	D2	Mass Movement	●	●	●
	D3	Water and Ice Landforms	●	●	●
	D4	Wind Landforms	●	●	●
Unit E	E1	Earthquakes and Faults	●	●	●
Earthquakes	E2	Earthquakes and Waves	●	●	●
	E3	The Strength of Earthquakes	●	●	●
	E4	Seismic Waves and the Earth's Interior	●	●	●
	E5	Living with Earthquakes	●	●	●
Unit F	F1	Formation of Volcanoes	●	●	●
Volcanoes	F2	Types of Volcanoes	●	●	●
	F3	Living with Volcanoes	●	●	●
Unit G	G1	Age of the Earth	●	●	●
Geologic Time	G2	The Geologic Timescale	●	●	●
	G3	Catastrophic Events and Mass Extinction	●	●	●
	G4	Earth's Future	●	●	●





Earth and Space Science, Content Standard D

Structure of the Earth System

The solid earth is layered with a lithosphere; hot, convecting mantle; and dense, metallic core.	A2
Lithospheric plates on the scales of continents and oceans constantly move at rates of centimeters per year in response to movements in the mantle. Major geological events, such as earthquakes, volcanic eruptions, and mountain building, result from these plate motions.	A2 B1-B3 E1-E5 F1-F3
Land forms are the result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, while destructive forces include weathering and erosion.	A3 B3 C4 D1-D4 F1-F3
Some changes in the solid earth can be described as the “rock cycle.” Old rocks at the Earth’s surface weather, forming sediments that are buried, then compacted, heated, and often recrystallized into new rock. Eventually, those new rocks may be brought to the surface by the forces that drive plate motions, and the rock cycle continues.	C2 C3
Soil consists of weathered rocks and decomposed organic material from dead plants, animals, and bacteria. Soils are often found in layers, with each having a different chemical composition and texture.	C1 C4
Water, which covers the majority of the earth’s surface, circulates through the crust, oceans, and atmosphere in what is known as the “water cycle.” Water evaporates from the earth’s surface, rises and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil, and in rocks underground.	A1 A3 C4 D3
Water is a solvent. As it passes through the water cycle it dissolves minerals and gases and carries them to the oceans.	A1 A3 C4 D3
The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.	A1
Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks, and contributing to the weathering of rocks.	C3 C4 G2 G3

Earth’s History

The Earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that occurred in the past. Earth’s history is also influenced by occasional catastrophes, such as the impact of an asteroid or comet.	G1-G3
Fossils provide important evidence of how life and environmental conditions have changed.	G1 G2

Earth in the Solar System

The Earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons, and smaller objects, such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system.	G4
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The Layered Earth: Correlations to Learning Standards

 **U. S. National Standards | Middle School: Grades 5–8**

The Layered Earth Lesson Plans

Physical Science, Content Standard B

Properties and Changes of Properties in Matter

Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties. In chemical reactions, the total mass is conserved. Substances often are placed in categories or groups if they react in similar ways; metals is an example of such a group.

C1

Chemical elements do not break down during normal laboratory reactions involving such treatments as heating, exposure to electric current, or reaction with acids. There are more than 100 known elements that combine in a multitude of ways to produce compounds, which account for the living and nonliving substances that we encounter.

C1-C4

Transfer of Energy

The sun is a major source of energy for changes on the Earth's surface. The sun loses energy by emitting light. A tiny fraction of that light reaches the Earth, transferring energy from the sun to the Earth. The sun's energy arrives as light with a range of wavelengths, consisting of visible light, infrared, and ultraviolet radiation.

G4





 **U. S. National Science Content Standards | Middle School: Grades 5–8**

The Layered Earth			A – Science as Inquiry	
	Lesson Plan Number	Lesson Plan Title	Abilities necessary to do scientific inquiry	Understandings about scientific inquiry
Unit A	A1	Earth as a System	●	●
The Solid Earth	A2	Earth's Layered Structure	●	●
	A3	Oceans and Continents	●	●
Unit B Plate Tectonics	B1	Continental Drift	●	●
	B2	Seafloor Spreading and Paleomagnetism	●	●
	B3	The Theory of Plate Tectonics	●	●
Unit C Minerals and Rocks	C1	Minerals: Building Blocks of Rocks		●
	C2	The Rock Cycle	●	●
	C3	Igneous, Sedimentary, and Metamorphic Rocks	●	●
	C4	Weathering and Soil Formation	●	●
Unit D Shaping the Earth	D1	Shaping Earth's Surface	●	●
	D2	Mass Movement	●	●
	D3	Water and Ice Landforms	●	●
	D4	Wind Landforms	●	●
Unit E Earthquakes	E1	Earthquakes and Faults	●	●
	E2	Earthquakes and Waves	●	●
	E3	The Strength of Earthquakes	●	●
	E4	Seismic Waves and the Earth's Interior	●	●
	E5	Living with Earthquakes	●	●
Unit F Volcanoes	F1	Formation of Volcanoes	●	●
	F2	Types of Volcanoes	●	●
	F3	Living with Volcanoes	●	●
Unit G Geologic Time	G1	Age of the Earth	●	●
	G2	The Geologic Timescale	●	●
	G3	Catastrophic Events and Mass Extinction	●	●
	G4	Earth's Future	●	●





The Layered Earth: Correlations to Learning Standards

 **U. S. National Science Content Standards | Middle School: Grades 5–8** *(continued)*

The Layered Earth			B – Physical Science		
	Lesson Plan Number	Lesson Plan Title	Properties and changes of properties in matter	Motions and forces	Transfer of energy
Unit A The Solid Earth	A1	Earth as a System			
	A2	Earth's Layered Structure			
	A3	Oceans and Continents			
Unit B Plate Tectonics	B1	Continental Drift			
	B2	Seafloor Spreading and Paleomagnetism			
	B3	The Theory of Plate Tectonics			
Unit C Minerals and Rocks	C1	Minerals: Building Blocks of Rocks	●		
	C2	The Rock Cycle	●		
	C3	Igneous, Sedimentary, and Metamorphic Rocks	●		
	C4	Weathering and Soil Formation	●		
Unit D Shaping the Earth	D1	Shaping Earth's Surface		●	
	D2	Mass Movement		●	
	D3	Water and Ice Landforms		●	
	D4	Wind Landforms		●	
Unit E Earthquakes	E1	Earthquakes and Faults		●	
	E2	Earthquakes and Waves		●	
	E3	The Strength of Earthquakes		●	
	E4	Seismic Waves and the Earth's Interior		●	
	E5	Living with Earthquakes		●	
Unit F Volcanoes	F1	Formation of Volcanoes			
	F2	Types of Volcanoes			
	F3	Living with Volcanoes			
Unit G Geologic Time	G1	Age of the Earth			
	G2	The Geologic Timescale			
	G3	Catastrophic Events and Mass Extinction			
	G4	Earth's Future			●





 **U. S. National Science Content Standards | Middle School: Grades 5–8** *(continued)*

The Layered Earth			D – Earth and Space Science		
	Lesson Plan Number	Lesson Plan Title	Structure of the Earth system	Earth's history	Earth in the solar system
Unit A	A1	Earth as a System	●		
The Solid Earth	A2	Earth's Layered Structure	●		
	A3	Oceans and Continents	●		
Unit B Plate Tectonics	B1	Continental Drift	●		
	B2	Seafloor Spreading and Paleomagnetism	●		
	B3	The Theory of Plate Tectonics	●		
Unit C Minerals and Rocks	C1	Minerals: Building Blocks of Rocks			
	C2	The Rock Cycle	●		
	C3	Igneous, Sedimentary, and Metamorphic Rocks	●		
	C4	Weathering and Soil Formation	●		
Unit D Shaping the Earth	D1	Shaping Earth's Surface	●		
	D2	Mass Movement	●		
	D3	Water and Ice Landforms	●		
	D4	Wind Landforms	●		
Unit E Earthquakes	E1	Earthquakes and Faults	●		
	E2	Earthquakes and Waves	●		
	E3	The Strength of Earthquakes	●		
	E4	Seismic Waves and the Earth's Interior	●		
	E5	Living with Earthquakes	●		
Unit F Volcanoes	F1	Formation of Volcanoes	●		
	F2	Types of Volcanoes			
	F3	Living with Volcanoes	●		
Unit G Geologic Time	G1	Age of the Earth		●	
	G2	The Geologic Timescale		●	
	G3	Catastrophic Events and Mass Extinction		●	
	G4	Earth's Future			●





The Layered Earth: Correlations to Learning Standards



The Layered Earth			E – Science and Technology	
	Lesson Plan Number	Lesson Plan Title	Abilities of technological design	Understandings about science and technology
Unit A	A1	Earth as a System	●	●
The Solid Earth	A2	Earth's Layered Structure	●	●
	A3	Oceans and Continents	●	●
Unit B	B1	Continental Drift	●	●
Plate Tectonics	B2	Seafloor Spreading and Paleomagnetism	●	●
	B3	The Theory of Plate Tectonics	●	●
Unit C	C1	Minerals: Building Blocks of Rocks	●	●
Minerals and Rocks	C2	The Rock Cycle	●	●
	C3	Igneous, Sedimentary, and Metamorphic Rocks	●	●
	C4	Weathering and Soil Formation	●	●
Unit D	D1	Shaping Earth's Surface	●	●
Shaping the Earth	D2	Mass Movement	●	●
	D3	Water and Ice Landforms	●	●
	D4	Wind Landforms	●	●
Unit E	E1	Earthquakes and Faults	●	●
Earthquakes	E2	Earthquakes and Waves	●	●
	E3	The Strength of Earthquakes	●	●
	E4	Seismic Waves and the Earth's Interior	●	●
	E5	Living with Earthquakes	●	●
Unit F	F1	Formation of Volcanoes	●	●
Volcanoes	F2	Types of Volcanoes	●	●
	F3	Living with Volcanoes	●	●
Unit G	G1	Age of the Earth	●	●
Geologic Time	G2	The Geologic Timescale	●	●
	G3	Catastrophic Events and Mass Extinction	●	●
	G4	Earth's Future	●	●





 **U. S. National Science Content Standards | Middle School: Grades 5–8** *(continued)*

The Layered Earth			F – Science in Personal and Social Perspectives			
	Lesson Plan Number	Lesson Plan Title	Populations, resources, and environments	Natural hazards	Risks and benefits	Science and technology in society
Unit A The Solid Earth	A1	Earth as a System	●			●
	A2	Earth's Layered Structure	●			●
	A3	Oceans and Continents	●			●
Unit B Plate Tectonics	B1	Continental Drift	●			●
	B2	Seafloor Spreading and Paleomagnetism	●			●
	B3	The Theory of Plate Tectonics	●			●
Unit C Minerals and Rocks	C1	Minerals: Building Blocks of Rocks	●			●
	C2	The Rock Cycle	●			●
	C3	Igneous, Sedimentary, and Metamorphic Rocks	●			●
	C4	Weathering and Soil Formation	●			●
Unit D Shaping the Earth	D1	Shaping Earth's Surface	●			●
	D2	Mass Movement	●			●
	D3	Water and Ice Landforms	●			●
	D4	Wind Landforms	●			●
Unit E Earthquakes	E1	Earthquakes and Faults	●	●	●	●
	E2	Earthquakes and Waves	●	●	●	●
	E3	The Strength of Earthquakes	●	●	●	●
	E4	Seismic Waves and the Earth's Interior	●	●	●	●
	E5	Living with Earthquakes	●	●	●	●
Unit F Volcanoes	F1	Formation of Volcanoes	●	●	●	●
	F2	Types of Volcanoes	●	●	●	●
	F3	Living with Volcanoes	●	●	●	●
Unit G Geologic Time	G1	Age of the Earth	●			●
	G2	The Geologic Timescale	●			●
	G3	Catastrophic Events and Mass Extinction	●			●
	G4	Earth's Future	●			●





The Layered Earth: Correlations to Learning Standards



The Layered Earth			G – History and Nature of Science		
	Lesson Plan Number	Lesson Plan Title	Science as a human endeavor	Nature of science	History of science
Unit A	A1	Earth as a System	●	●	●
The Solid Earth	A2	Earth's Layered Structure	●	●	●
	A3	Oceans and Continents	●	●	●
Unit B	B1	Continental Drift	●	●	●
Plate Tectonics	B2	Seafloor Spreading and Paleomagnetism	●	●	●
	B3	The Theory of Plate Tectonics	●	●	●
Unit C	C1	Minerals: Building Blocks of Rocks	●	●	●
Minerals and Rocks	C2	The Rock Cycle	●	●	●
	C3	Igneous, Sedimentary, and Metamorphic Rocks	●	●	●
	C4	Weathering and Soil Formation	●	●	●
Unit D	D1	Shaping Earth's Surface	●	●	●
Shaping the Earth	D2	Mass Movement	●	●	●
	D3	Water and Ice Landforms	●	●	●
	D4	Wind Landforms	●	●	●
Unit E	E1	Earthquakes and Faults	●	●	●
Earthquakes	E2	Earthquakes and Waves	●	●	●
	E3	The Strength of Earthquakes	●	●	●
	E4	Seismic Waves and the Earth's Interior	●	●	●
	E5	Living with Earthquakes	●	●	●
Unit F	F1	Formation of Volcanoes	●	●	●
Volcanoes	F2	Types of Volcanoes	●	●	●
	F3	Living with Volcanoes	●	●	●
Unit G	G1	Age of the Earth	●	●	●
Geologic Time	G2	The Geologic Timescale	●	●	●
	G3	Catastrophic Events and Mass Extinction	●	●	●
	G4	Earth's Future	●	●	●





**🇨🇦 Pan Canadian Curriculum:
Common Framework of Science Learning Outcomes
High School: Grades 11–12**

The Layered Earth Lesson Plans

Earth and Space Science: Specific Learning Outcomes

Earth Systems

330-1	Describe theories and evaluate the limits of our understanding of Earth's internal structure.	A2 E1 E4 F1
330-2	Classify rocks according to their structure, chemical composition, and method of formation.	C1 C2 C3 F2
330-3	Classify common minerals according to their physical and chemical characteristics.	C1
332-1	Describe interactions of components of the hydrosphere, including the cryosphere.	A1 D1 D2 D3 C4
332-3	Describe major interactions among the hydrosphere, lithosphere, and atmosphere.	A1 D1 D2 D3 C4

Earth Resources

330-8	Describe the importance of minerals and mineral exploration at the local, provincial, national and global levels.	C1
330-9	Describe the historical evolution of extraction and of the use of several resources obtained from the lithosphere.	C1

Earth Processes

331-9	Describe methods of monitoring and predicting earthquakes, volcanoes, and plate interactions.	E1 E2 E3 E4 E5 F1 F2 F3
332-8	Analyse evidence for plate tectonics theory.	B1 B2 B3
332-9	Relate plate tectonics to the processes that change Earth's surface.	B2 B3 E1 E2 E3 E4 E5 F1 F2 F3

Historical Geology

330-12	Use appropriate evidence to describe the geologic history of an area.	G1 G3 D1 D2 D3 D4
331-8	Describe the evidence used to determine the age of the Earth, and the historical evolution of establishing Earth's chronology.	G1 G2 G3 G4
332-4	Illustrate the geologic timescale and compare to human timescales.	G1 G2 G3 G4
332-5	Compare and contrast the principles of uniformitarianism and of catastrophism in historical geology.	G1 G4
332-6	Explain the appropriate applications of absolute and relative dating.	G1
332-7	Describe geological evidence that suggests life forms, climate, continental positions, and Earth's crust have changed over time.	B1 B2 B3





The Layered Earth: Correlations to Learning Standards

Pan Canadian Curriculum: Common Framework of Science Learning Outcomes High School: Grades 11 and 12

General Learning Outcomes

	Lesson Plan Number	Lesson Plan Title	Earth systems	Earth's resources	Earth processes	Historical geology
Unit A The Solid Earth	A1	Earth as a System	●		●	
	A2	Earth's Layered Structure	●		●	
	A3	Oceans and Continents	●		●	
Unit B Plate Tectonics	B1	Continental Drift	●		●	●
	B2	Seafloor Spreading and Paleomagnetism	●		●	●
	B3	The Theory of Plate Tectonics	●		●	●
Unit C Minerals and Rocks	C1	Minerals: Building Blocks of Rocks		●		
	C2	The Rock Cycle	●	●	●	
	C3	Igneous, Sedimentary, and Metamorphic Rocks	●	●	●	
	C4	Weathering and Soil Formation	●		●	
Unit D Shaping the Earth	D1	Shaping Earth's Surface	●		●	
	D2	Mass Movement	●		●	
	D3	Water and Ice Landforms	●	●	●	
	D4	Wind Landforms	●		●	
Unit E Earthquakes	E1	Earthquakes and Faults	●		●	●
	E2	Earthquakes and Waves	●		●	
	E3	The Strength of Earthquakes			●	
	E4	Seismic Waves and the Earth's Interior			●	●
	E5	Living with Earthquakes			●	
Unit F Volcanoes	F1	Formation of Volcanoes	●		●	
	F2	Types of Volcanoes			●	
	F3	Living with Volcanoes		●		●
Unit G Geologic Time	G1	Age of the Earth				●
	G2	The Geologic Timescale	●		●	●
	G3	Catastrophic Events and Mass Extinction		●		●
	G4	Earth's Future			●	●





**🇨🇦 Pan Canadian Curriculum:
Common Framework of Science Learning Outcomes
Middle School: Grades 5–8**

The Layered Earth Lesson Plans

Earth and Space Science: Specific Learning Outcomes

Weather (G5)

301-13 Relate the constant circulation of water on Earth to the processes of evaporation, condensation, and precipitation C4 D3 D4

Space (G6)

300-23 Describe the physical characteristics of components of the solar system—specifically, the sun, planets, moons, comets, asteroids, and meteors G4

Earth's Crust (G7)

310-1 Describe the composition of Earth's crust A1 A2
 310-2 Classify rocks and minerals based on their characteristics and method of formation C1 C2 C3
 310-3 Classify various types of soil according to their characteristics, and investigate ways to enrich soils C4
 311-1 Explain the processes of mountain formation and the folding and faulting of Earth's surface B1-B3
 311-2 Explain various ways in which rock can be weathered C4 D1-D4
 311-3 Relate various meteorological, geological, and biological processes to the formation of soils C1-C4 D1-D4
 311-4 Examine some of the catastrophic events, such as earthquakes or volcanic eruptions, that occur on or near Earth's surface E1-E5 F1-F3
 311-5 Analyse data on the geographical and chronological distribution of catastrophic events to determine patterns and trends G2 G3
 311-6 Develop a chronological model or timescale of major events in Earth's history G1-G3

Water Systems on Earth (G8)

311-7 Describe processes that lead to the development of ocean basins and continental drainage systems A3
 311-11 Describe processes of erosion and deposition that result from wave action and water flow D1 D3
 311-12 Describe factors that affect glaciers and polar icecaps, and describe their consequent effects on the environment D3





The Layered Earth: Correlations to Learning Standards

Pan Canadian Curriculum: Common Framework of Science Learning Outcomes Middle School: Grades 5–8

General Learning Outcomes

	Lesson Plan Number	Lesson Plan Title	Weather	Space	Earth's crust	Water systems on Earth
Unit A The Solid Earth	A1	Earth as a System			●	
	A2	Earth's Layered Structure			●	
	A3	Oceans and Continents				●
Unit B Plate Tectonics	B1	Continental Drift			●	
	B2	Seafloor Spreading and Paleomagnetism			●	
	B3	The Theory of Plate Tectonics			●	
Unit C Minerals and Rocks	C1	Minerals: Building Blocks of Rocks			●	
	C2	The Rock Cycle			●	
	C3	Igneous, Sedimentary, and Metamorphic Rocks			●	
	C4	Weathering and Soil Formation	●		●	
Unit D Shaping the Earth	D1	Shaping Earth's Surface			●	●
	D2	Mass Movement			●	
	D3	Water and Ice Landforms	●		●	●
	D4	Wind Landforms	●		●	
Unit E Earthquakes	E1	Earthquakes and Faults			●	
	E2	Earthquakes and Waves			●	
	E3	The Strength of Earthquakes			●	
	E4	Seismic Waves and the Earth's Interior			●	
	E5	Living with Earthquakes			●	
Unit F Volcanoes	F1	Formation of Volcanoes			●	
	F2	Types of Volcanoes			●	
	F3	Living with Volcanoes			●	
Unit G Geologic Time	G1	Age of the Earth			●	
	G2	The Geologic Timescale			●	
	G3	Catastrophic Events and Mass Extinction			●	
	G4	Earth's Future		●		

