

# **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

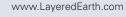
### The Origin and Evolution of the Earth System

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





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.	(1
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	B1	Continental Drift	•	•
Plate Tectonics	B2	Seafloor Spreading and Paleomagnetism	•	•
	B3	The Theory of Plate Tectonics	•	•
Unit C	<b>C</b> 1	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	•	•

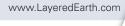


The Layered Earth			B – Physical Science			
	Lesson Plan Number	Lesson Plan Title	Structure and properties of matter	Motions and forces	Interaction of energy and matter	
Unit A	A1	Earth as a System			•	
The Solid Earth	A2	Earth's Layered Structure				
	A3	Oceans and Continents				
Unit B	B1	Continental Drift		•		
Plate Tectonics	B2	Seafloor Spreading and Paleomagnetism	•			
	B3	The Theory of Plate Tectonics	•	•	•	
Unit C	<b>C</b> 1	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			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	(1	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	•		•	



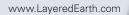


The Layered Earth			E — Science and Technology		
	Lesson Plan Number	Lesson Plan Title	Abilities of technological design	Understandings about science and technology	
Unit A The Solid Earth	A1 A2 A3	Earth as a System Earth's Layered Structure Oceans and Continents		•	
Unit B Plate Tectonics	B1 B2 B3	Continental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





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	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				
	C4	Metamorphic Rocks 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			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	•	•	•	
Jnit F	F1	Formation of Volcanoes	•	•	•	
/olcanoes	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	•	•	•	
		E -11 ( E -	_	_	_	



G4

Earth's Future



U. S. National Standards   Middle School: Grades 5–8	The	Laye	red E	arth Lesso	n Plans
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	СЗ			
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.	<b>C</b> 1	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	А3	<b>C</b> 4	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	G4				

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.





# 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

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.

### 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.

C1-C4

G4



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	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	•	•



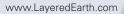


The Layered Earth			B – Physical Science			
	Lesson Plan Number	Lesson Plan Title	Properties and changes of properties in matter	Motions and forces	Transfer of energy	
Unit A	A1	Earth as a System				
The Solid Earth	A2	Earth's Layered Structure				
	A3	Oceans and Continents				
Jnit B	B1	Continental Drift				
Plate Tectonics	B2	Seafloor Spreading and Paleomagnetism				
	B3	The Theory of Plate Tectonics				
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Jnit F	F1	Formation of Volcanoes				
/olcanoes	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			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	B1	Continental Drift	•			
Plate Tectonics	B2	Seafloor Spreading and Paleomagnetism	•			
	B3	The Theory of Plate Tectonics	•			
Unit C	<b>C1</b>	Minerals: Building Blocks of Rocks				
Minerals and Rocks	C2	The Rock Cycle	•			
	C3	Igneous, Sedimentary, and Metamorphic Rocks	•			
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Unit D	D1	Shaping Earth's Surface	•			
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	G4	Earth's Future			•	



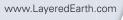


The Layered Earth			E — Science and Technology					
	Lesson Plan Number	Lesson Plan Title	Abilities of technological design	Understandings about science and technology				
Unit A	A1	Earth as a System	•	•				
The Solid Earth	A2	Earth's Layered Structure	•	•				
	A3	Oceans and Continents	•	•				
Unit B	B1	Continental Drift	•	•				
Plate Tectonics	B2	Seafloor Spreading and Paleomagnetism	•	•				
	B3	The Theory of Plate Tectonics	•	•				
Unit C	C1	Minerals: Building Blocks of Rocks	•	•				
<b>Minerals and Rocks</b>	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	•	•				
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Earthquakes	E2	Earthquakes and Waves	•	•				
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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		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	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	(1	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	•	•	•	•		
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	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			G – History and	Nature of Scien	ce
	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	<b>C1</b>	Minerals: Building Blocks of Rocks	•	•	•
<b>Minerals and Rocks</b>	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

**Geologic Time** 

G1

G2

G3

G4

Age of the Earth

Earth's Future

The Geologic Timescale

Catastrophic Events and Mass Extinction



# 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	(2	(3	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	<b>C</b> 4
332-3	Describe major interactions among the hydrosphere, lithosphere, and atmosphere.	A1	D1	D2	D3	(4

### **Earth Resources**

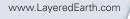
330-8	Describe the importance of minerals and mineral exploration at the local, provincial, national	C1
	and global levels.	
330-9	Describe the historical evolution of extraction and of the use of several resources obtained from	(1
	the lithosphere.	

### **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	В3							
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	G1	G2	G3	G4		
	establishing Earth's chronology.						
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	G1	G4				
	geology.						
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	B1	B2	B3			
	crust have changed over time.						





# 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	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	<b>C1</b>	Minerals: Building Blocks of Rocks		•		
<b>Minerals and Rocks</b>	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 Middle School: Grades 5–8

The Layered Earth Lesson Plans

Earth a	and Space Science: Specific Learning Outcomes			
Weath	er (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)			
310-1 310-2 310-3	Describe the composition of Earth's crust Classify rocks and minerals based on their characteristics and method of formation Classify various types of soil according to their characteristics, and investigate ways to enrich soils	A1 C1 C4	A2 C2	C3
311-1 311-2 311-3 311-4		B1-B3 C4 C1-C4 E1-E5	D1-D4 D1-D4 F1-F3	
311-5 311-6		G2 G1-G3	G3	
Water:	Systems on Earth (G8)			
311-7	Describe processes that lead to the development of ocean basins and continental drainage systems	A3		
	Describe processes of erosion and deposition that result from wave action and water flow Describe factors that affect glaciers and polar icecaps, and describe their consequent effects on the environment	D1 D3	D3	





# 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	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	<b>C</b> 1	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			•	
/olcanoes	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				

