Bachelor of Education (Elementary) &
Bachelor of Education (Secondary) STEM
Unit Plan Template

Unit Title: Earth Science | **Number of Lessons** 13-14 | **Time (in weeks):** 3 weeks

Name: Rita Ma | **Subject(s):** Science | **Grade(s):** 8

Rationale

The core objective of this unit is for students to understand the Theory of Plate Tectonics. This is not merely a geographical concept, but rather the unifying theory of modern geology.

Overview:

This unit explores the dynamic nature of Earth's surface through the lens of Plate Tectonic Theory. Students will investigate the scientific evidence ranging from continental shapes to seafloor spreading that led to our current understanding of Earth's internal structure and lithospheric movement. The curriculum moves from the "how" of plate mechanics (mantle convection and boundary types) to the "what" of visible geological features, such as earthquakes, volcanoes, and mountain ranges. Finally, students will connect these global processes to the local geological history of British Columbia, emphasizing how scientific knowledge informs community safety and emergency preparedness.

CORE COMPETENCIES

Communication	Thinking	Personal & Social
- **Acquiring and Using Specialized Terminology** Students will demonstrate their ability to describe and understand crustal movements by mastering a specialized vocabulary. They will move beyond general descriptions to using precise terms to explain the mechanisms of the Earth. - **Representing and Documenting:** Using scientific diagrams, physical models (such as the Oreo or clay models), and maps to illustrate the internal layers of the Earth and the movement of tectonic plates. - **Exchanging Information:** Engaging in peer discussions to evaluate the evidence for continental drift and seafloor spreading,	**Critical thinking** - **Questioning and Investigating** Students will investigate the cause-and-effect relationship between mantle convection and crustal movement (Topic 2). They must use logic to connect deep-earth processes to surface features like mountains and trenches. - **Analyzing Evidence:** Students will analyze the observations and data that led to the Theory of Plate Tectonics **Creative thinking** - **Generating Ideas and Modeling** Students will use creative methods to represent abstract concepts.	**Positive personal and cultural identity** - **Connecting to Place :** Students will explore how the geological history of British Columbia has shaped the landscapes they call home. They will recognize the cultural significance of geological features to local First Peoples and how these features inform their identity and stories. **Personal awareness and responsibility** - **Safety and Preparedness** Through Topic 4 (Concept 2), students will take ownership of their personal safety by learning how to prepare for geological events like earthquakes.

effectively using scientific vocabulary like *subduction*, *convection*, and *lithosphere*. - **Interpreting and Presenting:** Analyzing seismic data and geological maps of British Columbia to communicate risks and safety protocols associated with earthquakes and volcanic activity	- **Novelty and Value in Problem Solving** In the context of earthquake safety (Topic 4), students will design innovative solutions for earthquake-resistant structures or create unique emergency preparedness plans tailored to the BC landscape.	They will reflect on their own roles in emergency situations and develop a sense of self-reliance. **Big Idea: The theory of plate tectonics explains Earth's geological processes.** - **Community Contribution and Sustainability:** Students will understand how understanding geological hazards can help keep their broader community safe. They will consider how human infrastructure (like schools and bridges) should be built responsibly to withstand the geological processes of the Pacific Northwest.

BIG IDEAS
(multiple subject areas for integrated unit)

Subject Name
The theory of plate tectonics explains Earth's geological processes.

LEARNING STANDARDS

Curricular Competencies	Content
Questioning and Predicting - Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal interest. - Identify questions to answer or problems to solve through scientific inquiry **Planning and Conducting** - Use appropriate **technology** and equipment to make observations and collect data **Processing and Analyzing Data and Information** - Seek and analyze patterns, trends, and connections in data, such as interpreting the shapes and positions of Earth's continents to support the theory of continental drift. - Analyze the cause-and-effect relationship between mantle convection and crustal movement. **Evaluating**	**Evidence for Plate Tectonics:** - Including continental drift, seafloor spreading, and technological inferences about Earth's layers. **Plate Motion and Mechanics:** - The role of mantle convection in driving the movement of tectonic plates. **Geological Processes:** - The formation of earthquakes (seismic waves), volcanoes, and mountain ranges at plate boundaries. **Local Geological Impact:** - The geological history of British Columbia and how this knowledge informs safety and emergency preparedness.

- Evaluate the evidence for the theory of plate tectonics and explain how it provides a unified explanation for geological features. - Assess the significance of BC's geological history and how it affects where and how we live today. **Applying and Innovating** - Use knowledge of geological processes (like earthquakes) to develop safety protocols or emergency plans.	

Prerequisite Concepts and Skills:

Students should enter this unit with a foundational understanding of Earth's internal layers and the basic principles of heat transfer (specifically convection). They should possess basic modeling skills and the ability to distinguish between a scientific observation and an inference. Mastery of basic graphing and data interpretation is also expected.

Teacher Preparation Required:

Lesson #	**Teacher Preparation Required (See Unit Plan Sample)**
Lesson 1	
Lesson 2	
Lesson 3	
Lesson 4	
Lesson 5	
Lesson 6	
Lesson 7	
Lesson 8	
Lesson 9	
Lesson 10	

Cross-Curricular Connections:

Social Studies - Human Adaptation and Natural Hazards: Students examine how the physical geography of British Columbias shaped by plate tectonics has influenced the settlement patterns of both Indigenous peoples and early European settlers.

Aboriginal Connections/ First Peoples Principles of Learning:

We will also explore the concept of 'Sense of Place' by connecting BC's geological formations to the traditional territories and cultural identities of the local Secwépemc people.

Universal Design for Learning (UDL)

- Connect tectonic theory to the local landscape of Kamloops and BC to stimulate interest.
- Allow students to choose their research topics in project , such as local volcanic history or personal emergency preparedness.
- Use digital simulations (IRIS), 3D models (Oreo lab), and video documentaries to explain mantle convection and plate boundaries.

- Students may demonstrate their understanding of Topic 3 (Geological Processes) through a written report, a physical model, a digital presentation, or a video demonstration.

Differentiated Instruction (DI):

Instructional Strategies
- Provide a visual "Word Wall" or glossary featuring illustrations for abstract terms like *Subduction*, *Mantle Convection*, and *Lithosphere* to bridge the gap between terminology and concept.
Modified Testing
- Reduce the density of text-heavy questions on assessments; prioritize diagram labeling, matching, and visual identification of geological features.
Inquiry-based Extension:
- Provide self-directed research opportunities on high-level topics, such as the relationship between plate tectonics and global climate shifts or how paleomagnetism technology proves seafloor spreading.
Open-ended Projects:
- Offer the option to replace standard summative tasks with an inquiry project, such as producing a professional-style documentary or digital presentation on local geological risks specific to the Kamloops (Secwépemc) region.

Overview of Lessons: tswbat

Lesson 1

Name &Time (Minutes Allotted):	Topic 1 / Concept 1: Evidence of Continental Drift （77mins）
Learning Standards: Curricular Competencies	- **Questioning and predicting:** Demonstrate a sustained intellectual curiosity about a scientific topic. - **Processing and analyzing data and information:** Use fossil and geological evidence to construct a map of Pangea.
Learning Standards: Content	- Interpret the shapes and positions of Earth’s continents. - Evidence for the theory of plate tectonics (Continental Drift).
Instructional Objectives	- Students will be able to identify and explain the four main types of evidence for Continental Drift - Students will understand why Alfred Wegener’s theory was initially rejected
Assessment:	- Observation during the "Pangea Puzzle" activity. - Exit ticket: "List two pieces of evidence Wegener used and one reason his peers didn't believe him."
Teaching Strategies:	- Power point and not taking - Collaborative inquiry- based learning (activity)
Materials:	- Power point and note handout - World map printouts (cut into continental shapes). - Scissors and glue sticks. - "Evidence symbols" (fossils, mountains) for the puzzle activity. - Video clip: "Alfred Wegener's Story." - Or Pangaea Definition, Map & Geological History https://study.com/academy/lesson/what-is-pangaea-theory-definition-quiz.html
Lesson Activities:	

Introduction/Hook:	**The "Growing Map" Riddle:** Project a map of the world. Ask students: "If you look at the Atlantic Ocean, do the coastlines of South America and Africa look like they belong together?" Show a quick animation of the continents drifting apart to spark curiosity.
Body:	Introduce Alfred Wegener and his "Continental Drift" hypothesis. Go through PPT and notes. Activty: Puzzle Discussion: Introduce the concept that he had the *what* but not the *how*
Closure:	Students view other groups' maps to see if they reached the same "Pangea.". What evidence did Wegener use to support histheory of continental drift?

Lesson 2

Name &Time (Minutes Allotted):	Topic 1 / Concept 2: Using technology to infer the Earth's internal structure. 77mins
Learning Standards: Curricular Competencies	- **Processing and analyzing data:** Use models to represent the layers of the Earth and their relative thicknesses. - **Evaluating:** Describe how seismic technology provides a "window" into the Earth's interior without direct observation.
Learning Standards: Content	- **The layers of Earth:** Composition and physical properties (Crust, Mantle, Outer Core, Inner Core). - **Technology:** How seismology (earthquake waves) reveals the state of matter of internal layers.
Instructional Objectives	- Students will differentiate between the chemical layers (crust, mantle, core) and mechanical layers (lithosphere, asthenosphere)
Assessment:	- "Layer Labeling" worksheet during the lecture. - Exit Ticket (3 layers, 2 types of waves, 1 reason why the core is hot).
Teaching Strategies:	- **Direct Instruction:** Interactive PPT with diagrams. - **Analogies:** Using an egg or a peach diagram to represent Earth's layers.
Materials:	- Slinkys (for wave demonstration). - Colored pencils and "Earth's Interior" diagram handouts. - Video: "How we know what's inside the Earth." - **Why all map are wrong** - "The Earth: Crash Course Astronomy #11(10:13)"
Lesson Activities:	
Introduction/Hook:	- **The "Mystery Box":** Bring a sealed box with an object inside. Ask students how they can find out what's inside without opening it (shaking, weighing, X-rays). Compare this to Earth: We've only ever drilled 12km deep, but Earth is 6,371km to the center. How do we know what's down there? - **Why all map are wrong** https://www.youtube.com/watch?v=kIID5FDi2JQ
Body:	- **The Layers Breakdown:** Guided note-taking on the Crust, Mantle (plasticity), Outer Core (liquid metal), and Inner Core (solid due to

	pressure). Distinguish between the **Lithosphere** (the plates) and the **Asthenosphere** (the wax-like layer they slide on). - **Scaling the Earth:** Students draw a cross-section of Earth, ensuring they represent the Crust as a very thin line compared to the thick Mantle and Core. - "The Earth: Crash Course Astronomy #11(10:13)" - https://www.youtube.com/watch?v=w-9gDALvMF4
Closure:	- Crack a hard-boiled egg diagram to show how the "crust" breaks into plates, the "white" is the mantle, and the "yolk" is the core. Collect the 3-2-1 Exit Tickets.

Lesson 3

Name &Time (Minutes Allotted):	Topic 1 / Concept 3: Sea-floor spreading and mid-ocean ridges. 77mins
Learning Standards: Curricular Competencies	• **Processing and analyzing data:** Use magnetic striping data to determine the relative age of the ocean floor. • **Evaluating:** Describe how new technology (Sonar/Magnetometers) changed our understanding of the ocean floor.
Learning Standards: Content	• **Sea-floor spreading:** The process by which new oceanic crust is created at mid-ocean ridges and destroyed at trenches. • **Paleomagnetism:** Magnetic reversals as evidence for spreading.
Instructional Objectives	Students will be able to explain the process of seafloor spreading.
Assessment:	- Complete the notes - Quick Quiz: Labeling a diagram of a ridge with "Oldest/Youngest" rock and "North/South" magnetic polarity.
Teaching Strategies:	- Using maps of the age of the ocean floor. - Creating a physical paper model of a spreading ridge.
Materials:	- Paper model templates (slotted paper and "crust" strips). - Markers (Red/Blue for magnetic polarity). - Video: "Sea Floor Spreading with Bill Nye (4:01)" https://www.youtube.com/watch?v=GyMLlLxbfa4
Lesson Activities:	
Introduction/Hook:	**The Flat Floor Myth:** Ask students: "Is the bottom of the ocean flat like a bathtub?" Show a sonar map of the Atlantic Ocean. Point out the giant mountain range (Mid-Atlantic Ridge) and ask, "Why is there a mountain range in the middle of the sea instead of near the continents?"
Body:	- Go through PPT and notes.

	- Explain the theory of Sea-Floor Spreading. Use the analogy of a grocery store conveyor belt. As new rock comes up, old rock is pushed aside. - Students create a "Sea-Floor Spreading Model." They pull a strip of paper through a slit in another piece of paper (the ridge). As they pull it out, they color it to show "Normal" and "Reverse" magnetic polarity.
Closure:	- Exit ticket: We now know *how* the continents move—they are being pushed by the growing ocean floor. Collect models for assessment.

Lesson 4

Name &Time (Minutes Allotted):	Topic 1 / Concept 4: A Unified Theory.
Learning Standards: Curricular Competencies	Identify major geological features on a global map and correlate them with specific plate boundaries.
Learning Standards: Content	- How it provides a unified explanation for geological features and processes. - Identifying the shapes and positions of Earth's major tectonic plates.
Instructional Objectives	- Students will explain how Continental Drift and Sea-floor Spreading combined to form the Theory of Plate Tectonics. - Students will accurately label the 7-10 major tectonic plates on a world map.
Assessment:	- Check for accuracy during the plate labeling activity. - Exit ticket requiring students to name one major plate and describe its movement relative to a neighbor.
Teaching Strategies:	- Overlaying earthquake/volcano maps with plate boundary maps. - Hand-labeling and color-coding tectonic maps. - Summarizing the "Unified Theory."
Materials:	- Colored pencils (Red, Blue, Green). - Reference maps showing global plate boundaries. - PPT presentation on "The Big Picture."
Lesson Activities:	
Introduction/Hook:	- Project a map showing the locations of the world's major earthquakes and volcanoes. Ask students: "Why do these natural disasters follow such specific 'lines' across the globe rather than being random?" Link these lines to the edges of plates.
Body:	- PPT and note - Briefly lecture on how the "What" (Continental Drift) and the "How" (Sea-floor Spreading) merged to create the Theory of Plate Tectonics. - Students use reference materials to find and label major plates including the Pacific, North American, Eurasian, African, Antarctic, Indo-Australian, and South American plates. Use arrows to show general directions of movement. - Introduce the three types of movement: Divergent (moving apart), Convergent (coming together), and Transform (sliding past)
Closure:	- Exit ticket: Show an animation of where the continents are projected to be in 50 million years. Ask students to reflect on how today's mapped boundaries will dictate tomorrow's geography.

Lesson 5

Name &Time (Minutes Allotted):	Topic 2 / Concept 1: Earth's surface as a collection of lithospheric plates. What are tectonic plates?
Learning Standards: Curricular Competencies	- Use a world map to identify the locations of major and minor tectonic plates. - Apply the concept of plate boundaries to explain global patterns of geological activity.
Learning Standards: Content	- Earth's surface is made of huge, rigid rocky plates (Lithosphere) floating on a partially molten layer (Asthenosphere). - Continue: Divergent, Convergent, and Transform.
Instructional Objectives	- Students will define a "tectonic plate" and distinguish between oceanic and continental crust. - Students will identify the three types of plate boundaries based on the relative direction of plate movement.
Assessment:	- Walking around to verify the accuracy of student plate labels and boundary color-coding. - Quick-fire Quiz – "Which plate is BC located on?" and "Name a plate that is primarily oceanic crust." - Or "where is the safe palce to build school"
Teaching Strategies:	- Guided labeling using physical geography as a reference. - Video"Plate tectonics (1:13)" https://www.youtube.com/watch?v=ryrXAGY1dmE
Materials:	- Colored pencils (3 specific colors for boundary types). - Interactive Digital Map (e.g., IRIS Earthquake Browser). - Handout
Lesson Activities:	
Introduction/Hook:	- Bring in a hard-boiled egg with a cracked shell. Show students how the shell is broken into pieces that can slide over the "white" underneath. Explain that Earth's "shell" is just like this—rigid pieces called plates that float on the hot, plastic-like mantle.
Body:	- **Mapping Activity:** Students receive a blank map of the world. Using a reference, they must: 1. Outline and label the major plates (Pacific, North American, Eurasian, etc.). 2. Differentiate between **Oceanic plates** (mostly water-covered) and **Continental plates**. 3. Color the North American plate specifically to see its massive scale.
Closure:	- Have students use their hands to mimic the three boundary types as you call them out. End by asking: "Looking at your map, what kind of boundary do we have off the coast of British Columbia?"

Lesson 6

Name &Time (Minutes Allotted):	Topic 2 / Concept 2: Divergent and Transform boundaries. 77mins
Learning Standards: Curricular Competencies	- Boundary simulation (hands-on movement with foam blocks). Classify boundary types. - Classify the three main types of plate boundaries based on observed physical results.

Learning Standards: Content	- Tectonic plates move relative to each other, causing certain geologic activities. - The theory of plate tectonics provides a unified explanation for geological features.
Instructional Objectives	- Students will simulate Divergent, Convergent, and Transform boundaries using foam blocks. - Students will identify the specific geologic activities (earthquakes, volcanoes, mountain building) associated with each boundary type.
Assessment:	- Observation of the "Boundary Simulation" to ensure correct directional movement. - Exit ticket: Boundary Classification
Teaching Strategies:	- Working in small groups to solve "geological puzzles.
Materials:	- Video: PhET: Plate Tectonicso https://phet.colorado.edu/en/simulation/legacy/plate-tectonics - Sets of foam blocks (two colors to represent oceanic vs. continental crust). - "Boundary Simulation" lab sheet. - Sand or clay (optional, to place on top of foam to show mountain folding).
Lesson Activities:	
Introduction/Hook:	- Ask: "Is the Earth growing or shrinking here? What happens to the space in between?"
Body:	- Boundary Classification: Brief lecture defining the three movements: Divergent, Convergent, and Transform. Briefly explain that "geologic activities" like quakes and volcanoes are the results of these interactions. - **Hands-on Simulation (Foam Blocks):** 1. **Divergent:** Pull blocks apart; observe the "gap" (rift valley/ocean ridge). 2. **Convergent (Collision):** Push two "continental" blocks together; observe the "folding" (mountains). 3. **Convergent (Subduction):** Push "oceanic" under "continental"; observe the trench. 4. **Transform:** Slide blocks horizontally; feel the friction and sudden "slip" (earthquakes).
Closure:	- Discuss which of these three movements is currently happening off the coast of BC (the Cascadia Subduction Zone)

Lesson 7

Name &Time (Minutes Allotted):	Topic 2 / Concept 2: Convergent boundaries (Subduction vs. Collision). 77mins
Learning Standards: Curricular Competencies	- Formulate a hypothesis about how temperature differences cause fluid movement. - Use the convection lab to model how mantle heat moves tectonic plates above.
Learning Standards: Content	- Subduction (Oceanic-Continental) vs. Collision (Continental-Continental). - The transfer of thermal energy that contributes to plate movement.

Instructional Objectives	- Students will distinguish between subduction and collision based on crust density.
Assessment:	- Observation of lab setup and "prediction vs. result" discussion.
Teaching Strategies:	- Thermal Convection Lab. - Comparative diagrams of subduction vs. collision.
Materials:	- Clear rectangular plastic bins, beakers of very hot water, and ice water. - Food coloring (Red and Blue). - Droppers. - Lab goggles and aprons.
Lesson Activities:	
Introduction/Hook:	- **The Sinking Ship:** Ask students: "If a heavy wooden boat and a thin piece of plastic collide in water, which one stays on top?" Relate this to **Density**. Explain that in the Earth, the "heavier" (denser) oceanic plate always loses the battle and sinks.
Body:	- Use diagrams to show why the Himalayas (Collision) have no volcanoes, while the Andes or BC's Coast Mountains (Subduction) do. Focus on how sinking crust melts to create magma. - **Thermal Convection Lab:** 1. Students fill a bin with room-temp water. 2. Place the bin on two beakers (one with boiling water at one end, one with ice at the other). 3. Carefully drop Red dye over the heat and Blue dye over the cold. 4. **Observation:** Watch the red dye rise, move across the surface, and sink at the cold end. 5. **Connection:** Explain that the "plates" (lithosphere) are just floating on this moving "liquid" (asthenosphere).
Closure:	- Have students draw arrows on their lab sheet. Ask: "If a plate were sitting on top of the red dye, which way would it move?" This prepares them for the "Mantle Convection" focus in the next lesson.

Lesson 8

Name &Time (Minutes Allotted):	Topic 2 / Concept 3: Mantle Convection as the driving force.
Learning Standards: Curricular Competencies	- Use a simple physical model to demonstrate the transfer of thermal energy. - Create a scientific diagram to illustrate how convection currents move tectonic plates.
Learning Standards: Content	- How the movement of molten rock (magma) in the asthenosphere contributes to the movement of lithospheric plates.
Instructional Objectives	- Students will define convection and explain how temperature affects the density of fluids. - Students will describe how "Slab Pull" and "Ridge Push" are related to convection currents.
Assessment:	- Review of the student-drawn convection diagrams for correct arrow direction. - A "Cause and Effect" worksheet: "If the core cooled down, what would happen to the tectonic plates?"
Teaching Strategies:	- Video-based convection demo.

	- Explaining the mechanical link between the mantle and the crust.
Materials:	- "Convection Currents- iScience Year 9 (1:05)" https://www.youtube.com/watch?v=HK1DvM26jzM - How does mantle convection relate to theundemo?
Lesson Activities:	
Introduction/Hook:	- Introduce the idea that heat creates movement.
Body:	- Explain the roles of the **Core** (the heater), the **Mantle** (the fluid), and the **Crust** (the passengers). Define how hot material rises (less dense) and cold material sinks (more dense). - **Diagramming the Mantle:** - Teacher demo activity: convecion in cup and guided drawing activity. Students draw a cross-section of the Earth and add circular "Convection Cells." They must add arrows showing where plates are pushed apart (ridges) and pulled together (trenches).
Closure:	- Exit ticket: Explain mantle convection using the following terms:Ridge push, Slab pull, Lithosphere, Asthenosphere.

Lessson 9

Name &Time (Minutes Allotted):	Topic 3 / Concept 1 & 2: How plate movement produces seismic energy.
Learning Standards: Curricular Competencies	- Differentiate between P, S, and Surface waves based on speed and movement style. - Apply knowledge of plate boundaries to explain earthquake frequency and magnitude.
Learning Standards: Content	- Most earthquakes occur near tectonic plate boundaries. - Movement along faults produces seismic waves.
Instructional Objectives	- Students will explain how the buildup and sudden release of stress at plate boundaries creates seismic waves. - Students will identify the characteristics of P-waves and S-waves.
Assessment:	- Observation of student participation during the Slinky wave demonstration.
Teaching Strategies:	- Using Slinkys to model wave movement.
Materials:	- Video footage of BC earthquake drills or historical Cascadia data. - PPT on Wave Mechanics.
Lesson Activities:	
Introduction/Hook:	- Magnitude earthquake rattles northern B.C. - http://globalnews.ca/news/3416519/6-2-magnitude-earthquake-rattles-northern-b-c/
Body:	Activity 1: Foam Faults http://ceetep.oregonstate.edu/sites/ceetep.oregonstate.edu/files/2-foam_faults.pdf - In groups of 2, have students create their 3Dmodel using 1 foam block cut into 3 pieces (asshown in the document above) - Assign each group of students one fault that theyare required to understand how to replicate withtheir blocks.

	- Have each group teach each other about theirassigned fault. By the end, each student shouldknow how to use their blocks to create each ofthe 3 faults. Activity 2: Earthquake Map https://earthquake.usgs.gov/earthquakes/map/ - In groups of 2, have students determine where 3of the highest magnitude earthquakes occurredand state which tectonic plates were involved.
Closure:	- Quick check for understanding: "If an earthquake happens in Vancouver, which wave hits Victoria first, the P or the S?" Briefly preview how we use these arrival times to find the epicenter

Lesson 10

Name &Time (Minutes Allotted):	Topic 3 /concept 3:Volcanoes & subduction zones
Learning Standards: Curricular Competencies	- Use a global map of volcanic activity to identify the "Ring of Fire" and correlate it with subduction zones.
Learning Standards: Content	- Most volcanoes occur where oceanic crust collides with another plate (subduction zones).
Instructional Objectives	- Students will describe how the subduction of dense oceanic crust leads to melting and volcanic eruptions. - Students will identify the "Ring of Fire" as a major zone of subduction and volcanic activity.
Assessment:	- Peer-review of the Subduction Diagram for scientific accuracy (correct labeling of the trench, magma, and volcano). - Map Analysis Quiz – identifying three specific countries on the Ring of Fire and explaining why they have volcanoes.
Teaching Strategies:	- Analyzing global volcanic distribution maps. - Scientific sketching and labeling.
Materials:	Using the Richter Scale to MeasureEarthquakes - http://study.com/academy/lesson/using-the-richter-scale-to-measure-earthquakes.html
Lesson Activities:	
Introduction/Hook:	- Pull an elastic band slowly until it snaps. Explain that rocks at plate boundaries act like this—they store energy (elastic strain) until the friction can no longer hold them, releasing a burst of seismic energy.
Body:	- Explain the "Subduction" process. When oceanic crust sinks, it carries water into the mantle. This water helps melt the surrounding rock into magma, which then rises to the surface. - Students use red markers to trace the boundaries of the Pacific Plate on their world maps and plot at least 5 famous volcanoes
Closure:	- Exit ticket: Ask students: "Is BC part of the Ring of Fire?" Briefly discuss the Garibaldi Volcanic Belt in British Columbia as a local example of this process.

Lesson 11

Name &Time (Minutes Allotted):	Topic 3 / Concept 4: Formation of the Ring of Fire and the Himalayas.
Learning Standards: Curricular Competencies	- Use models to demonstrate how pressure and density determine geological outcomes. - Compare and contrast the formation of volcanic mountains versus fold mountains using specific case studies.
Learning Standards: Content	- Mountain ranges form when continental crust collides - Differences between subduction-zone mountains and collision-zone mountains.
Instructional Objectives	- Students will describe the process of continental-continental collision.
Assessment:	- Observation of the "Crumpling Paper" model to ensure students understand upward crustal growth. - Venn Diagram comparing the formation of the Himalayas vs. the Andes
Teaching Strategies:	- Group discussion on "Why no volcanoes?" - Hands-on paper/fabric crumpling.
Materials:	- Handout "Boundary Outcome" comparison worksheet. - Video: "The Birth of the Himalayas." - https://www.youtube.com/watch?v=PDrMH7RwupQ
Lesson Activities:	
Introduction/Hook:	- Show a photo of sea shell fossils found at the top of Mt. Everest. Ask: "How did creatures from the bottom of the ocean end up 8,000 meters in the sky?" Introduce the concept that the ocean floor was "squeezed" upward.
Body:	- Explain the high-speed collision of the Indian Plate into the Eurasian Plate. Highlight that because both are continental crust, neither wants to sink—so they both go *up*. **Activity: Crumpling Paper Model:** - 1. Students place two sheets of paper flat on a desk, edges touching. 2. Slowly push them together. 3. Observe how the paper folds and "grows" vertically. Relate this to **Fold Mountains**.
Closure:	- Group discussion: Ask students: "Looking at the mountains in BC, do you think they formed more like the Himalayas or more like the Ring of Fire?"

Lesson 12

Name &Time (Minutes Allotted):	Topic 4 / Concept 1: The formation of BC through "Terranes."
Learning Standards: Curricular Competencies	- Use regional geological maps to identify the different terranes that make up BC.
Learning Standards: Content	- The province was built by "Terranes"—islands and crustal fragments that crashed into and docked with the North American plate over millions of years.
Instructional Objectives	- Students will define "Terranes" and explain how they contributed to BC's westward growth.

Assessment:	- Guided check during the BC Tectonic Map coloring activity.
Teaching Strategies:	- Color-coding the "collage" of BC's geology.
Materials:	- BC Tectonic/Terrane map handouts. - Colored pencils. - Video British Columbia Geology https://www.youtube.com/watch?v=PgEO-4qPyUc
Lesson Activities:	
Introduction/Hook:	- Show a photo of the Rocky Mountains vs. the Coast Mountains. Explain that unlike the flat prairies, BC was built "piece by piece" like a messy collage of islands hitting a continent.
Body:	- **Activity: BC Tectonic Map:** Students color a map of BC based on its five major geological belts (Insular, Coast, Intermontane, Omineca, Foreland). They will identify which "piece" their specific town or city sits on.
Closure:	- Students write a brief response: "How does the fact that BC is a 'collage' of different rock types affect our industry (mining) or where we build our major highways?"

Lesson 13

Name &Time (Minutes Allotted):	Topic 4 / Concept 2: Earthquake preparedness and safety in BC.
Learning Standards: Curricular Competencies	- Develop a plan of action to address a personal or community geological hazard.
Learning Standards: Content	- We use our knowledge of geological processes to help keep safe. - Identifying risks and mitigation strategies for the Cascadia subduction zone.
Instructional Objectives	- Students will identify local geological hazards using regional hazard maps.
Assessment:	- Completion of the "Household Hazard Hunt" checklist. - Performance Task: Design a Hazard Map for the school or their local neighborhood.
Teaching Strategies:	- Using BC-specific emergency data - Small group brainstorming for emergency kits.
Materials:	- BC Earthquake Hazard Maps (Liquefaction and Tsunami zones). - Emergency kit templates/checklists. - Poster paper and markers. - Video What would a magnitude 15 earthquake be like? https://www.youtube.com/watch?v=e3uk7jU3RHo
Lesson Activities:	
Introduction/Hook:	- Watch a 3-minute simulation of what a Magnitude 9.0 Cascadia earthquake might feel like. Ask students: "If the power went out and the roads were blocked right now, what is the first thing you would need?"

Body:	- **Hazard Mapping Task:** Students examine local municipal maps to identify high-risk zones (areas prone to landslides, tsunamis, or liquefaction). They must mark "safe zones" and "danger zones" on their maps. **Earthquake Preparedness Activity:** - 1. **The Kit:** In groups, students prioritize items for a 72-hour emergency kit. 2. **The Drill:** Practice the official "Drop, Cover, and Hold On" procedure. Discuss why standing in a doorway is actually a myth. 3. **Home Safety:** Discuss securing heavy furniture to walls (preventing "non-structural" damage).
Closure:	- Poster or map with safe school location

Resources:

- Textbook Science 8
- Handout
- Digital and media from youtibe, Gizmos, and Study
- Hands-on Lab Materials
- Print & Reference Materials

Extensions to Unit:

- Seismic Triangulation
- Global or localcase study

Reflections and Revisions