Name Date

Topic 4.3 Summary

How does the theory of plate tectonics explain Earth's geological processes?

Use with textbook pages 298–313.

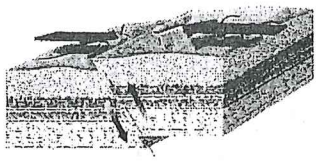
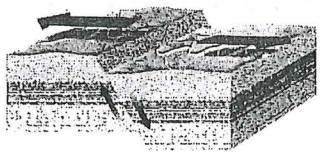
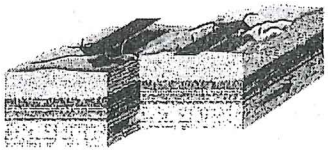
Earthquakes

Almost all **earthquakes** occur at tectonic plate boundaries. The movement of the plates applies pressure to rock. When the pressure is too great, the rock breaks and the energy is released in the form of an earthquake. A **fault** is the surface along which rocks break and move. The three types of faults are summarized in the table below.

The place deep in the crust where an earthquake starts is called the focus. The surface location directly above the focus is called the epicentre. As an earthquake occurs, vibrations called seismic waves are released.

Seismographs are used to measure and record ground movement. Data from seismographs can be used to determine strength and location of an earthquake. The Richter scale is used to represent the **magnitude** or strength of an earthquake. An increase of 1 on the scale represents a 10-fold increase in the strength of the earthquake.

Types of Faults

Reverse	• rock is squeezed together • one block rides up and over the other block • crust is shortened	
Normal	• rock is pulled apart • one block slips down relative to the other block • crust is lengthened	
Strike-slip	• blocks of rock move past each other horizontally	

Summarize

Write a short paragraph that summarizes the relationship among a fault, a focus, and an epicentre.

Name Date

Topic
4.3
Summary

Reading Check

What is the difference between magma and lava?

Volcanoes

Magma moves from the mantle to Earth's surface at **volcanoes**. When magma reaches the surface of Earth it is referred to as lava.

Volcanoes can occur at oceanic-oceanic or oceanic-continental convergent plate boundaries. When an oceanic plate is subducted beneath another plate, magma can rise to form volcanoes. An oceanic trench forms where an oceanic plate is subducted. A curved group of volcanic islands forms when an oceanic plate subducts beneath another oceanic plate. High mountain ranges form when an oceanic plate subducts beneath a continental plate.

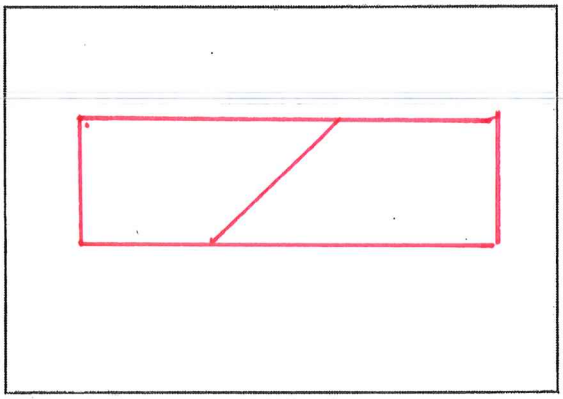
Mountain Ranges

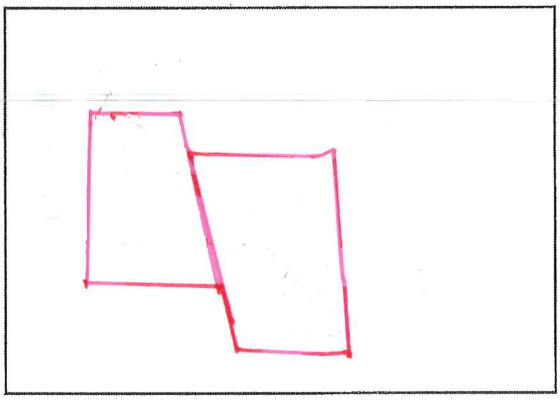
Mountain ranges form at convergent plate boundaries. At oceanic-continental convergent boundaries volcanic mountains form as well as mountain ranges produced from pressure from colliding plates. At continental-continental plate boundaries, there is no subduction. This means one plate is pushed up on the other forming mountains. This is how the Himalayan mountain range is thought to have formed.

At the Surface: Before and After

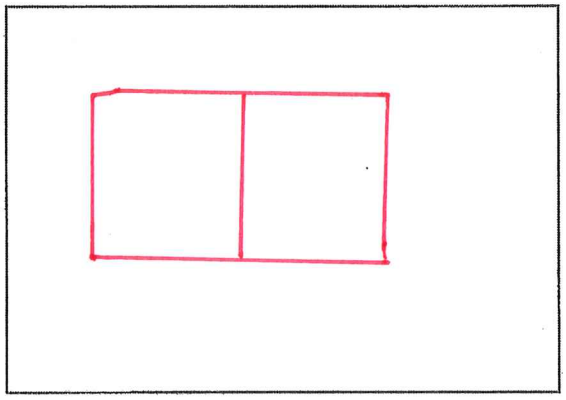
Use with textbook pages 300-301.

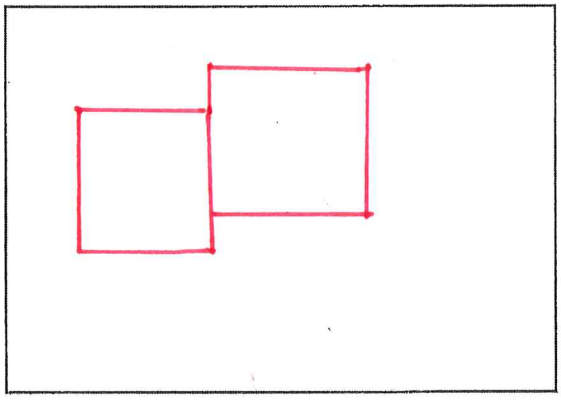
1. Draw a cross-section or aerial view that shows what an area of land looks like before and after an earthquake occurs along a normal fault.



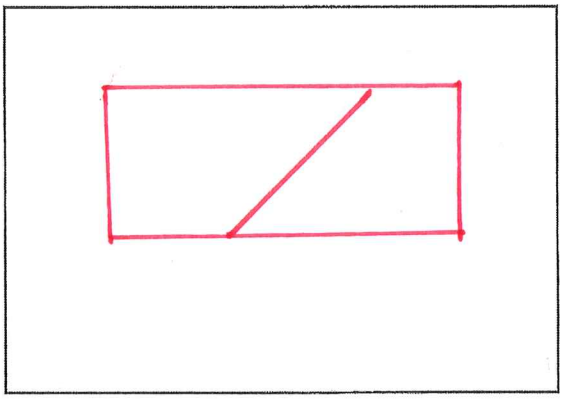


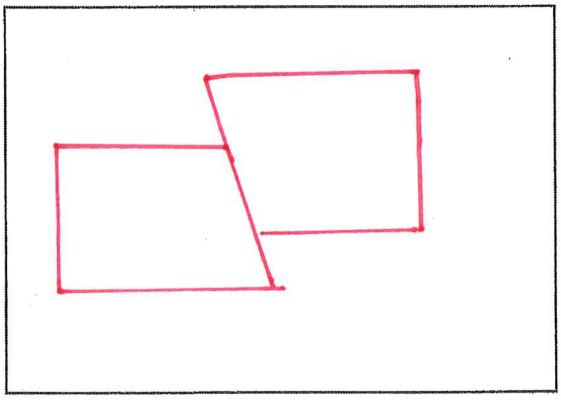
2. Draw a cross-section or aerial view that shows what an area of land looks like before and after an earthquake occurs along a strike-slip fault.





3. Draw a cross-section or aerial view that shows what an area of land looks like before and after an earthquake occurs along a reverse fault.





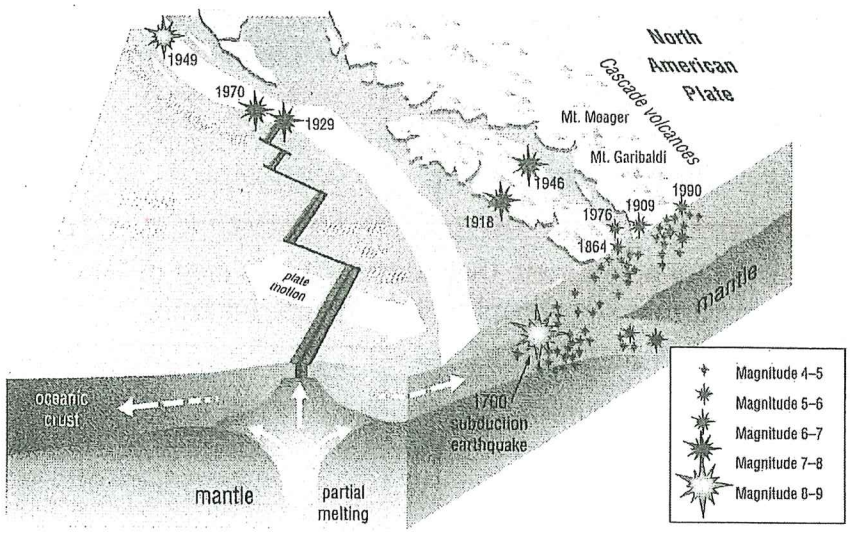
Name Date

Applying and Innovating
Topic 4.3

Interpreting Epicentres of the Juan de Fuca Plate

Use with textbook pages 300–301.

There is a usually an earthquake of very low magnitude (strength) every day in B.C. Most of these earthquakes originate beneath the ocean floor. Some have their focus in the crust at depths of 20 km or less. Major earthquakes occur within the Juan de Fuca plate and the subduction zone shown in the diagram below. Only earthquakes larger than magnitude 4 are shown. (Earthquakes of magnitude 4 will be felt by most people but are unlikely to cause much damage. Magnitude 5 and higher earthquakes have damaging effects.)



Write a paragraph to answer this question: Why do you think there are so many earthquakes in this area? Your answer should be based on evidence from the diagram and your understanding of plate tectonics.

Answers will very but should show an understanding of the subduction of the Juan de Fuca Plate under the North American plate, how subduction can lead to earthquakes, how volcanoes indicate subduction is occuring and any other relevant information.

Name Date

Communicating
Topic 4.3

Volcanoes at Convergent Boundaries

Use with textbook pages 306–307.

1. Explain how volcanoes form at convergent plate boundaries.

When a plate is subducted at an oceanic-oceanic or oceanic-continental convergent boundry, magma rises into the upper plate and can rise to the surface and cause a volcanic eruption.

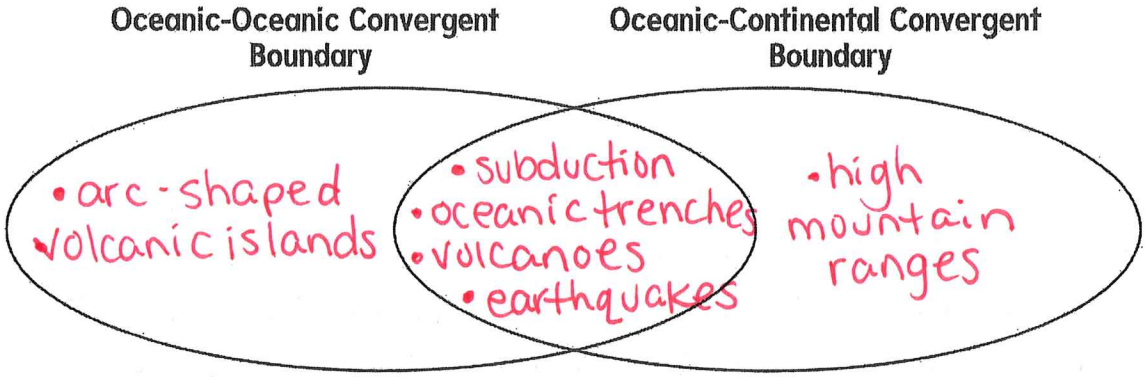
2. What characteristic of the converging plates determines which plate is subducted? You may wish to refer back to Topic 4.2 in your textbook, if necessary.

The density of the converging plates determines which plate is subducted.

3. List the hazards that volcanoes can present.

Volcanic hazards include lava, release of hot gases, volcanic ash, and landslides.

4. Use the Venn diagram to compare the geologic features at the two types of oceanic convergent boundaries.



5. Why do islands form at an oceanic-oceanic convergent plate boundary?

Volcanoes erupt under the ocean surface and as volcanic ash builds up, islands form.

6. Why do mountain ranges form at an oceanic-continental convergent plate boundary?

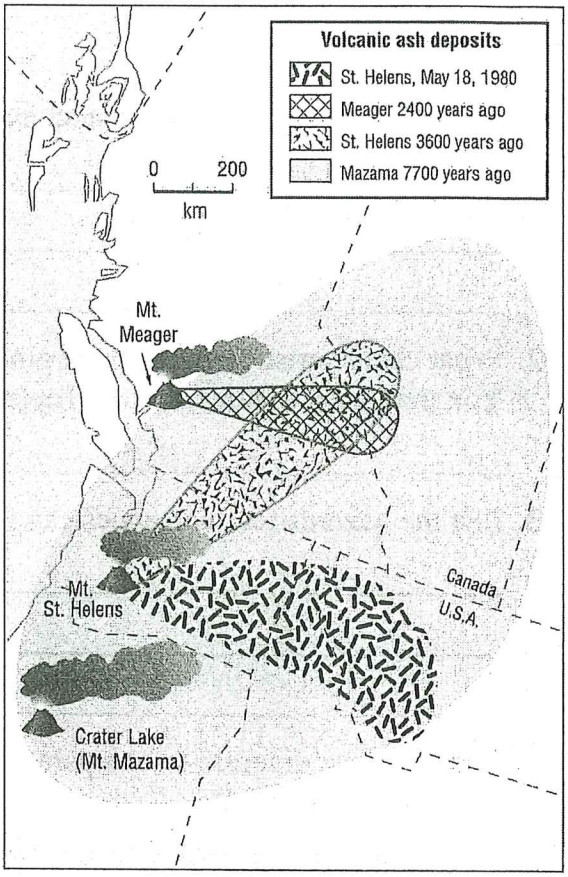
Pressures produced by the colliding plates cause the crust to fold and crumple, producing high mountain ranges.

Name Date

Applying and Innovating
Topic 4.3

Volcanic Ash Analysis

An erupting volcano can produce huge clouds of ash that extend hundreds of kilometres. The ash can cause breathing problems as well as damage to crops, buildings, and machinery. The map at right shows deposits of volcanic ash in western North America over a long period of time. Use the map to answer the questions that follow.



1. Which volcano created the largest expanse of ash? When did it happen?

Mt. Mazama, 7700 years ago.

2. What direction do you think the wind was blowing when the volcanoes erupted? What evidence are you using to make your inference?

Winds were from the west blowing ash to the east. The evidence is the ash fall in relation to the volcano locations.

3. Why are cities in the interior of B.C. more likely than coastal cities to receive ash from the volcanoes shown?

The winds would tend to blow ash towards the interior.

Name Date

Evaluating
Topic 4.3

Mountain Ranges

Use with textbook pages 307, 309, and 310.

1. Why do colliding continental plates behave differently than an oceanic plate colliding with a continental plate?

Because both plates are of similar densities, neither of the colliding plates subduct. So, one is shoved under the other.

2. Why is there no volcanic activity at a continental-continental convergent boundary?

There's no volcanic activity because there is no subduction and, therefore, no magma rises to the surface.

3. Explain the differences between the formation of the Coast Mountains in British Columbia and the Himalayan Mountains in southern Asia.

The coast mountains in B.C. formed due to an oceanic-continental convergent boundry while the Himalayan Mountains formed due to a continental-continental convergent boundary.

4. The Burgess Shale is famous for its fossils. It is located 2286 m above sea level in Yoho National Park near Golden, British Columbia. It contains 508-million-year-old fossils of sea organisms that lived on a reef. Use plate tectonics to explain how fossils of sea creatures can be found high in the mountains.

The collision of the Juan de Fuca plate and North American plate has caused the crust to fold and crumple. This folding and crumpling has forced what used to be oceanic crust into mountains.

5. What plates collided (and are still colliding) and resulted in the formation of the Himalayan Mountains?

The Indian plate and the Eurasian plate.