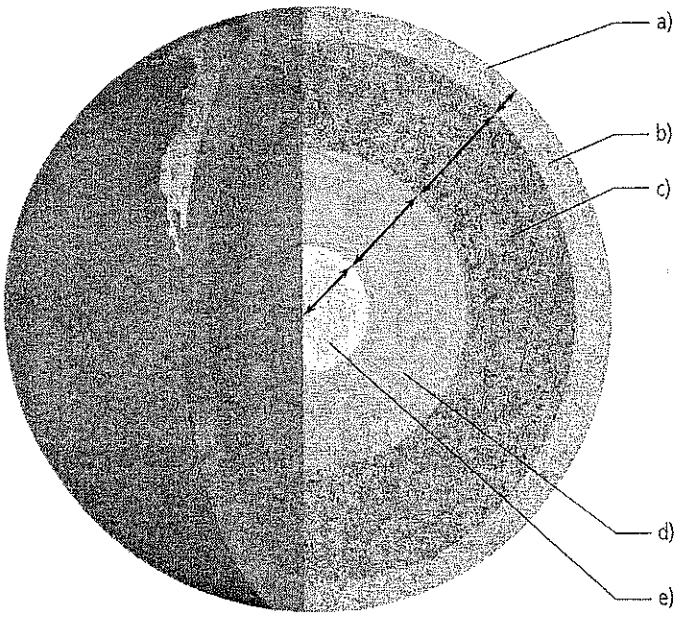
Use with textbook pages 520–522.

Layers of the Earth

Earth is made up of layers with distinct characteristics.

1. Label the layers of the Earth on the following diagram.



Layers of the Earth

2. Each layer of the earth has a varying thickness, state (solid, liquid, gas) and composition. Fill in the following table beginning with the innermost layer in the order that you would find the layers from the inside to the outside of earth.

Layer	Thickness	State	General composition
(a)			
(b)			
(c)			
(d)			
(e)			

3. What is the difference between the lithosphere and the asthenosphere?

Use with textbook pages 522-- 528

Features of plate tectonics

1. What do geologists believe heats the upper mantle portion of the asthenosphere?

2. What is one of the driving forces behind plate movement?

3. What is the difference between a rift valley and a spreading ridge?

4. What occurs when dense oceanic plates collide with a continental plate?

5. What events commonly occur at subduction zones?

6. When geologists record plate boundaries on a map, symbols are used to represent the three main types of plate interactions. Draw and label the three main symbols representing plate interactions.

   (a) _____

   (b) _____

   (c) _____

7. Describe the type of plate interactions that have occurred at the following geographic locations.

Geographic location	Plate interaction
1. East African Rift	
2. Juan de Fuca plate	
3. Islands of Japan	
4. Himalayan mountains	
5. San Andreas Fault	

8. When continental plates collide, does subduction occur? Explain your answer.

Name Date

Applying Knowledge
Section 12.2

Use with textbook pages 528–536.

Seismic waves, earthquakes, and volcanoes

Seismic waves can be either body waves that travel underground or surface waves that travel along the surface of the Earth.

1. Fill in the table below, summarizing the different types of seismic waves.

Seismic wave	Abbreviation	General diagram of wave	Description of action	Type of material it travels through	Speed it travels at
primary wave					
secondary wave					
surface wave					

Measurement of Earthquakes

2. What is a seismometer?

3. How does the term magnitude relate to how earthquake activity is recorded?

4. What scale is often used to measure the magnitude of an earthquake?

5. What is the difference between the focus of an earthquake and the epicentre?

6. Explain the classification scale used to describe the depth of origin of earthquakes.

7. For the three geographic locations listed below, classify the type of volcano found there and describe what type of events led to its formation.

Geographic location	Type of volcano	Description of events
Mount Garibaldi volcano		
Anahim Volcanic Belt		
Kraflla volcano		

Use with textbook pages 518–534.

Features of plate tectonics

Matching

Match each Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.

Term	Definition
1. _____ asthenosphere	A. the point on Earth's surface directly above the focus where an earthquake starts
2. _____ epicentre	B. a recurring current in the mantle that occurs when hotter, less dense material rises, cools, and then sinks again
3. _____ lithosphere	C. the process in which new material at a ridge or rift pushes older material aside, moving the tectonic plates away from the ridge
4. _____ mantle convection	D. a steep-sided valley formed on land when magma rises to Earth's surface at a spreading centre on land
5. _____ plate boundary	E. a partly molten layer in Earth's upper mantle just below the lithosphere
6. _____ ridge push	F. areas of subduction, which typically experience large earthquakes and volcanic eruptions
7. _____ rift valley	G. a long chain of volcanoes
8. _____ slab pull	H. the region where two tectonic plates are in contact
9. _____ subduction zone	I. the pulling of a tectonic plate as its edge subducts deep into the mantle
10. _____ volcanic belt	J. the layer made up of the crust and upper most mantle

Multiple Choice

Circle the letter of the best answer.

11. Which layer of the Earth has the highest temperature?

A. inner core **C.** lower mantle

B. outer core **D.** upper mantle

12. What causes the asthenosphere to be molten?

A. gravity **C.** hot spot

B. volcanoes **D.** radioactive decay

13. Where do transform plate boundaries usually occur?

A. near mountains

B. near continents

C. near ocean ridges

D. near subduction zones

14. Which layers of the earth can S-waves travel through?

A. mantle only

B. mantle and outer core

C. mantle and inner core

D. mantle, outer core, and inner core

15. Where are composite volcanoes usually found?

A. near subduction zones

B. in ocean basins

C. on mountain ranges

D. by ridge pushes

Section 12.2
Features of Plate Tectonics
Check Your Understanding

Checking Concepts

1. List three kinds of plate boundaries.

2. What is ridge push?

3. How is the worldwide pattern of earthquakes and volcanoes related to tectonic plates?

4. (a) What are convection currents?

   (b) Name the region of Earth's interior where convection currents occur.

   (c) How do convection currents affect tectonic plates?

5. (a) Name the type of island chain that forms over geologic hot spots.

   (b) How does an island chain form over a geologic hot spot?

6. What geologic feature is associated with rift eruptions?

7. Which type of seismic waves can travel through Earth's outer core?

8. What do seismometers detect and record?

9. What does a time-distance graph of seismic waves show?

10. After an earthquake, what type of seismic wave is the first to reach earthquake monitoring stations?

Understanding Key Ideas

11. Describe the movement of tectonic plates in the following locations.

    (a) a mid-ocean ridge

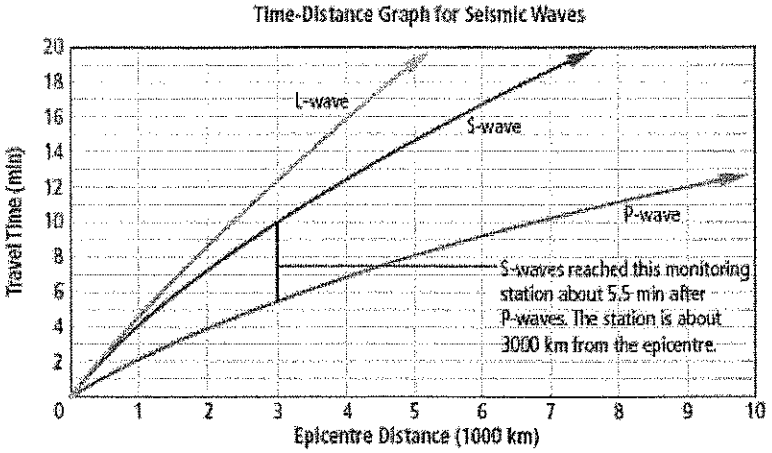
    (b) a convergent boundary

    (c) a transform boundary

12. Why do volcanoes usually form at subduction zones but not at transform boundaries?

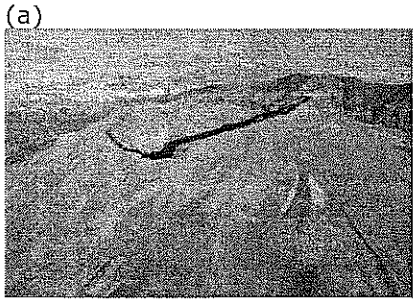
13. How does the ground motion produced by a P-wave compare to the ground motion produced by a surface-wave?

14. Refer to the time-distance graph (Figure 12.25) shown on the next page (and on text page 531). How far does each seismic wave (P, S, and L) travel in 8 min?



15. What are the correct names for the types of volcanoes shown below (and on text page 537)?

(a)



(b)

(c)

Pause and Reflect

The rock that continents are made of can be as old as 4 billion (4 000 000 000) years. The oldest rock on the ocean floor is less than 200 million (200 000 000) years. Use the plate tectonic theory to explain this observation.