

# The continents are in constant movement

Earth Science



Transitional Science 10

Note and Activity Package for Chapter 12

### Note:

If you lose this package it is your responsibility to print out a new copy from Ms. Veenstra's webpage:  
<https://veenstra.wordpress.com/transitional-science-10/>

---

### Vocabulary

asthenosphere, continental drift theory, converging/diverging plates, earthquakes, epicentre, fault, hot spot, inner core, lithosphere, mantle, mantle convection, outer core, paleoglaciatioin, plate boundary, plate tectonic theory, primary waves, ridge push and slab pull, rift valley, secondary waves, spreading ridge, subduction zone, surface waves, tectonic plate, transform fault, trench, volcanic belt, volcanic island arc, volcanoes

---

## Chapter 12 Learning Goal

Mark		Reference
	1. I can describe evidence for continental drift theory (e.g., fossil evidence, mountain belts, paleoglaciation)	Chapter 12.1
	2. I can relate the following to plate tectonic theory: - the world distribution of volcanoes, earthquakes, mountain belts, trenches, mid-ocean ridges, and rift valleys - hot spot and subduction zone eruptions - magnetic reversals and age of rocks relative to spreading ridges	Chapter 12.1
	3. I can define plate tectonics, plate boundary, earthquake, trench, volcano, spreading ridge, subduction zone, hot spot	Chapter 12.2
	4. I can identify the layers of the Earth.	Chapter 12.2
	5. I can explain how mantle convection and ridge push and slab pull are believed to contribute to plate motion. I can identify sources of heat within the Earth that produce mantle convection and hot spot activity.	Chapter 12.2
	6. I can describe tectonic plate boundaries, including transform boundaries, divergent boundaries, convergent boundaries (oceanic-oceanic crust, oceanic- continental crust, and continental-continental crust) and identify the matching tectonic mapping symbols	Chapter 12.2
	7. I can explain how plate movements are linked to Earthquakes.	Chapter 12.2
	8. I can explain how plate movements produces composite and shield volcanoes	Chapter 12.2
	9. I can explain how seismic waves are used to describe earthquakes and study Earth's interior composition.	Chapter 12.2

Quizzes and assignments: Mark =        %	Test: Mark:        %	Overall Mark =        %
---	-------------------------	----------------------------

# Chapter 12.1 Evidence for Continental Drift

## Activity 12.1

### Before you read answer the following questions

1. Do you think it is possible for the continents to move? If so, do you think they are moving now?

### Reading Exercise 1

Read “*What is continental drift?*” p. 207 in workbook and answer the following questions in full sentences

A. What name did Wegener give the “supercontinent” that split apart?

B. What evidence did Wegener observe to support the idea of continental drift theory?

C. What is the **Continental Drift Theory**?

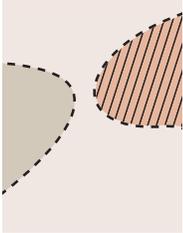
## Pangaea puzzle

### Procedure:

1. Cut out each continent at the edge of the dotted lines.
2. Use the clues provided in the legend below and the shapes of the continents to help you reconstruct Pangaea.

Note: a modern world map may give you some clues as to how they all fit together.

3. Check with Ms. Veenstra before glueing the continents in place on the next page.

Fossils	Glacier Deposits	Matching Mountains	Goal Deposits
			

# Pangaea

1. Which continents were easiest to fit together? Explain why.
2. Were there any pieces of Pangaea that you found difficult to place? If so, what other evidence would have helped you to place these pieces?

## Chapter 12.1 Notes

<b>Evidence for continental drift</b>	
<b>Matching Fossils</b>	
<b>Climatic Evidence Paleogeology</b>	<b>Coal Deposits</b>

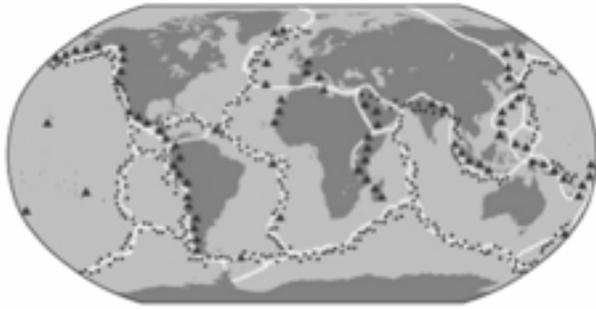
### Reading Exercise 2:

Read "*How do continents move?*" p. 207- 208 (mid-page) in workbook and answer the following questions in full sentences

- A. How did mapping the locations of volcanoes and earthquakes help to support the continental drift theory?
- B. What is a tectonic plate?
- C. What is the Mid-Atlantic Ridge?

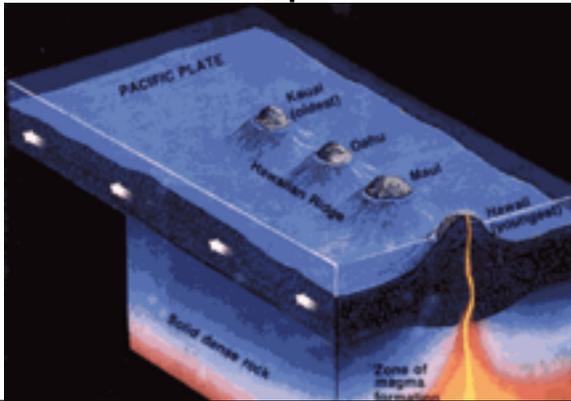
# Chapter 12.1 Notes continued

## Plate Tectonics Theory

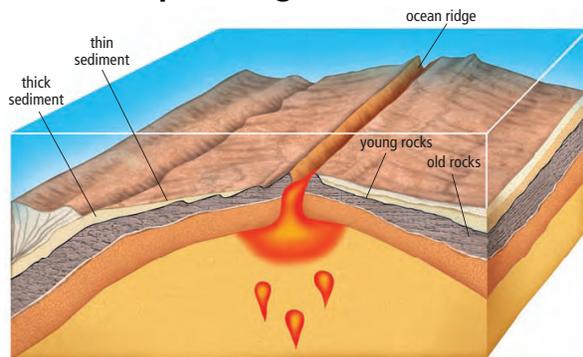


## Further Evidence for Continental Drift

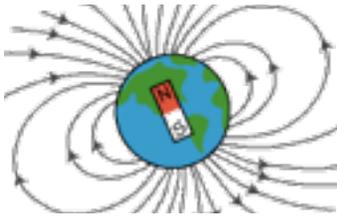
### The Hawaiian Hotspots



### Seafloor spreading at the Mid-Atlantic Ridge



## Magnetic Reversal



## Magnetic Striping



## Paleomagnetism Discussion Questions

To answer the following question see the picture on the board.

1. Based on the diagram, how many times has the Earth's magnetic field reversed during the past four million years?
2. Approximately when did the current interval of normal polarity begin?
3. If there had been compasses four million years ago, which direction would compass needles have pointed?

Name: \_\_\_\_\_ Block: \_\_\_\_\_

## Definition Chart for Chapter 12.1

<b>Term</b>	<b>Verb</b>	<b>General Category</b>	<b>Specific Characteristics/ Function</b>
continents			
continental drift theory			
earthquakes			
fossils			
hotspot			
magnetic reversal			

magnetic striping			
magma			
Mid-Atlantic Ridge			
molten rock			
paleo glaciation			
Pangaea			
plate tectonic theory			

polarity			
sea floor spreading			
sediment			
spreading ridge			
tectonic plate			
volcanoes			

## 12.2 Layers of the Earth

Use p. 519 to fill out notes about the different layers of the Earth.

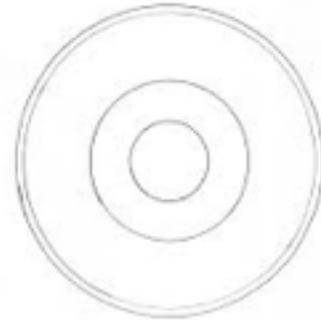
Name: \_\_\_\_\_

Solid or Liquid

Thickness: \_\_\_\_\_

Made out of: \_\_\_\_\_

Other facts \_\_\_\_\_



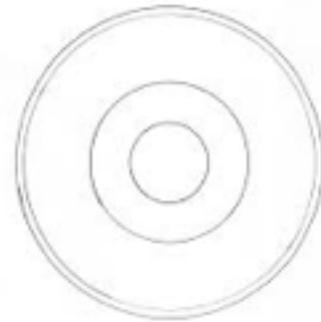
Name: \_\_\_\_\_

Solid or Liquid

Thickness: \_\_\_\_\_

Made out of: \_\_\_\_\_

Other facts \_\_\_\_\_



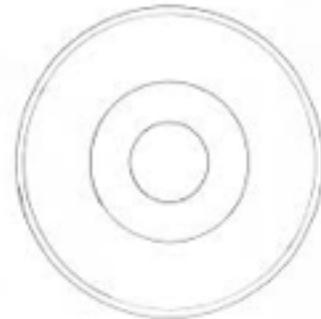
Name: \_\_\_\_\_

Solid or Liquid

Thickness: \_\_\_\_\_

Made out of: \_\_\_\_\_

Other facts \_\_\_\_\_



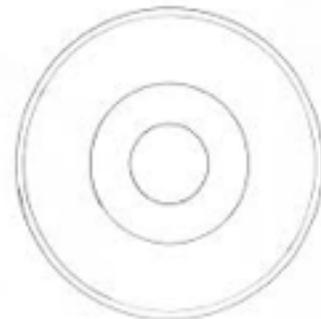
Name: \_\_\_\_\_

Solid or Liquid

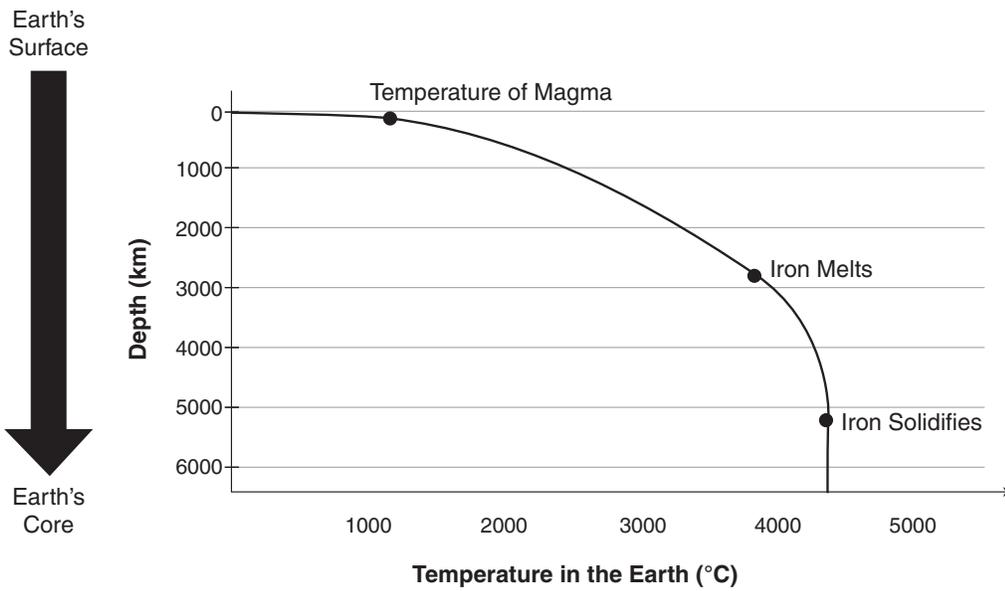
Thickness: \_\_\_\_\_

Made out of: \_\_\_\_\_

Other facts \_\_\_\_\_



## Inside the Earth discussion questions



Use the graph above to help you answer the following questions:

1. What happens to the temperature as you go deeper into the Earth?
2. What do you think happens to the density as you go deeper into the earth? Why?
3. Using the graph, identify the depth of the upper boundary of the Earth's outer core.
4. Why does melted iron become solid again at a depth of 5200 km?
5. How do you think we know what is inside the Earth?

# 12.2 Plate Movements

## Plate Motion

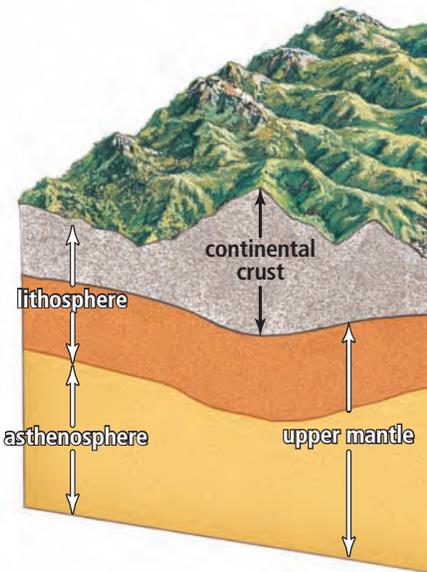
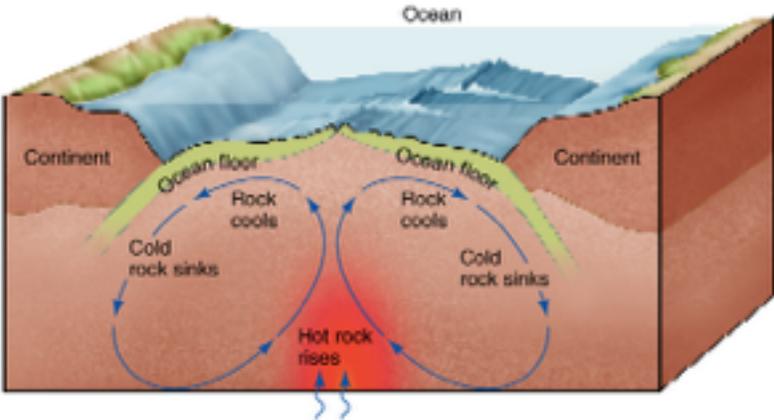


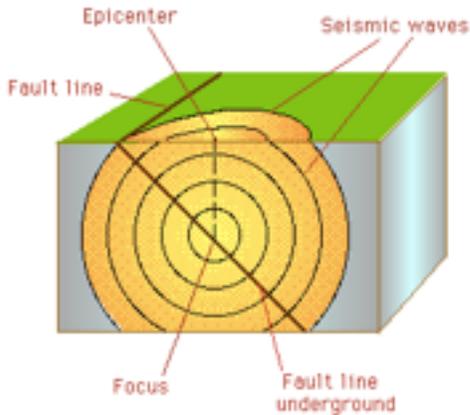
Figure 12.14 A cross-section through Earth's



Copyright 1999 John Wiley and Sons, Inc. All rights reserved.

## 12.2 Describing Earthquakes

### Earthquakes



### Measuring Earthquakes

Seismograph

Richter scale

Seismogram

### Earthquakes discussion questions

1. Most Earthquakes have shallow foci (less than 70 km deep), but you can get earthquakes with a focus deeper than 300 km. At which plate boundary do you think they might happen?
2. Convergent plate boundaries experience the most Earthquakes at higher magnitude. Find two larger cities that are susceptible to a higher magnitude Earthquake.

## 12.2 Seismic waves

	Primary Wave	Secondary Wave	Surface Wave
Abbreviation			
Travels through (solid, liquid, gas)			
Speed of wave			
Description			
Sketch of <b>motion</b> of wave			

### Seismic waves discussion questions

See Figure 12.23 on p. 530 in the textbook to answer the following questions

1. Why does the velocity increase deeper into the mantle?
  
2. Why does the S waves disappear in the outer core?
  
3. If the focus of a shallow Earthquake happens 400 km away, how long would it take for the S-waves to arrive?

## 12.2 Describing Volcanos

	Composite Volcanos	Shield Volcanos
Description		
Example		
Shape (drawing)		
Description of eruption		
Viscosity of magma		
Tectonic setting (convergent, divergent, hotspot)		

## Definition Chart for Chapter 12.2

Term	Verb	General Category	Specific Characteristics/ Function
asthenosphere			
composite volcano			
convergent (plate boundary)			
crust			
divergent (plate boundary)			
epicenter			
fault			
focus			

inner core			
lithosphere			
magnitude			
mantle			
mantle convection			
outer core			
plate boundaries			
primary waves			
ridge-push			

rift valley			
secondary waves			
seismic waves			
shield volcano			
surface waves			
slab-pull			
subduction zone			
transform boundary			
trench			