

Science 10
12.1 Sheet

Name: _____
Date: _____

Instructions: Read pages 506-513 and answer the following questions in point form

1. What does the continental drift theory state?
2. What gave Wegener his first piece of evidence for continental drift?
3. What is Pangaea?
4. What is a better way to align the continents other than matching up their continental edges?
5. What are three other clues that Wegener used as evidence for continental drift?
6. What did Wegener note about certain mountain ranges and rock ages on opposing continents?
7. Explain how the appearance of the Mesosaurus fossil in South America and Western Africa supports the concept of continental drift.
8. a) Which continents is the Glossopteris fossil found on?

b) Explain how this provides evidence for the existence of Pangaea .

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9. What are a two features left behind by retreating glaciers?
10. What is Paleoglaciation?
11. a) Why were scientists puzzled by evidence of glaciers in India and Africa?

b) How is this evidence explained?
12. a) Explain why coal deposits in Antarctica are hard to account for with today's climate there.

b) What's the best explanation for the Antarctic coal deposits?
13. Why was Wegener's theory not accepted immediately?
14. What did scientists NOT KNOW about the earth's surface in Wegener's time?
15. What are tectonic plates?
16. Describe volcanoes.
17. Describe earthquakes.

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18. Where do earthquakes and volcanoes mostly occur in relation to tectonic plates?

19. What were Oceanographers amazed to find on the bottom of the Atlantic Ocean?

20. What did scientists notice about the age of rocks near the Mid Atlantic Ridge?

21. What was noticed about the amount of sediment on the ocean floor as you moved away from the Mid Atlantic Ridge?

22. How is the earth like a bar magnet?

23. Why do compasses point north?

24. Describe magnetic reversal and explain what scientists think causes it to occur.

25. **If magnetic reversal occurred right now, what direction would a compass point?

26. What is Paleomagnetism?

27. What did scientists notice about the direction of magnetic fields in iron containing rocks on the bottom of the Atlantic Ocean?

28. Make a sketch of figure 12.11 on page 512 and describe the process of sea floor spreading using your diagram.

On your diagram, label the following things: Newer Rock, Older Rock, Magma.

Also, put arrows on your diagram that show the direction the sea floor is moving.

29. What is a hot spot?



- Early maps of the world caused Wegener to propose the _____ theory.
 - The continents looked as though they might fit together like _____.
 - The original supercontinent was named P_____ by Wegener.
 - Wegener also realized that other evidence also supported his theory.
 - There were matching geologic features and _____ on different continents.
 - There were matching _____ like *Mesosaurus*, on different continents.
 - There was evidence of glaciers on _____ continents.

See pages 506 - 508
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- Wegener's evidence for continental drift _____ explain how entire continents could change locations.
 - New scientific equipment allowed scientists to measure the slow but steady drift of Earth's _____ plates.
 - It was noted that _____ and volcanoes appear in certain patterns along the edges of tectonic plates.
 - Mapping of the ocean floor revealed the _____ Ridge, a long mountain range running down the middle of the Atlantic Ocean.
 - Rocks taken from the Mid-Atlantic Ridge were _____ than other ocean rocks.
 - Paleomagnetism shows that magnetic rocks along the ridges are striped with _____ magnetic fields.

See pages 610 - 612
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Name _____ Date _____

Use with textbook pages 506-513

Evidence for continental drift

Vocabulary	
ancient glaciers	mountain ranges
fossils	Pangaea
geological structures	plate tectonic theory
hot spot	spreading ridge
magma	supercontinent
magnetic reversal	tectonic plates
Mid-Atlantic Ridge	

Use the terms in the vocabulary box to fill in the blanks. Each term may be used only once.

- Alfred Wegener proposed that, millions of years ago, all the continents were joined as a _____.
- The name given to this giant land mass is _____.
- Wegener compared _____, _____ and evidence of _____ on different continents.
- Since rocks found in Newfoundland are the same type and age as rocks found in Greenland, Ireland, Scotland, and Norway, it would appear that the world's major _____ were continuous when the continents were joined.
- The surface of the Earth is broken into large, rigid, movable _____ that move over a layer of partly molten rock.
- In the _____, scientists found that as distance increases from the centre of the ridge, the rocks are older and the ocean sediment is thicker.
- Using a magnetometer, scientists found a pattern of _____ in the iron-containing minerals on both sides of the Mid-Atlantic Ridge.
- Harry Hess suggested that _____ rises because it is less dense than the material that surrounds it.
- At a _____ the magma breaks through the Earth's surface, where it cools and hardens, forming a new sea floor.
- J. Tuzo Wilson suggested that chains of volcanic islands were formed when a tectonic plate passed over a stationary _____.
- The _____ is the unifying theory of geology.



- Hess suggested that magma rose to form new _____ at certain places.
 - Magma (melted rock) rises and falls like _____ and _____ liquids.
 - The convection currents of magma formed a spreading ridge where they broke through Earth's _____.
 - Like a "new crust" _____ belt
 - Magnetic striping of basalt rock shows long stripes of new rock moving away from ocean ridges and also reveals the _____ of Earth's magnetic field at that time.
- Wilson then _____ the ideas of Wegener and Hess into the plate tectonic theory.
 - Geologic hot spots are anywhere _____ a rises to Earth's surface.

See pages 512 - 513
Take the Section 12.1
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Use with textbook pages 506-513.

Theories related to continental drift

Various pieces of evidence have been gathered by scientists to explain the underlying theories of geology. Alfred Wegener, Harry Hess, and J. Tuzo Wilson are some of the scientists who proposed explanations of phenomena they had observed.

Fill in the following table comparing the main points of evidence presented by each theory.

Continental drift	Paleomagnetism
Proposed by: _____	Main points: _____
Main points: _____	_____
_____	_____
_____	_____
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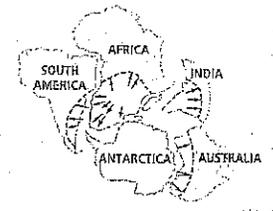
Use with textbook pages 509-515.

Visual observations supporting continental drift

Illustrations can demonstrate some of the major points related to the concepts presented in this chapter.

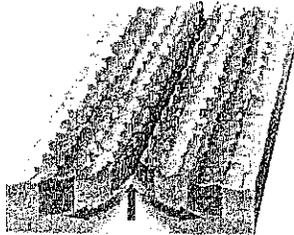
Refer to the diagrams on the left, when answering the questions below.

1. What evidence did Wegener use for his explanations of the existence of Pangaea?



Pangaea

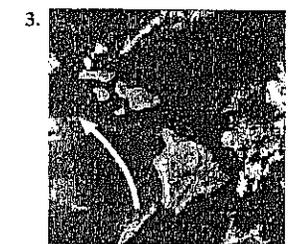
2. Normal magnetic polarity
 Reverse magnetic polarity



Orientation of Earth's Magnetic Field

(a) How were these magnetic patterns measured?

(b) What do these patterns show?



Hawaiian Islands

How were the Hawaiian Islands formed?

Section 12.1
Evidence for Continental Drift
Check Your Understanding



Checking Concepts

1. What is a supercontinent?
2. List three pieces of evidence that indicate that continental drift occurred in the distant past.
3. Briefly describe two pieces of evidence that suggest that Antarctica was once located farther from the South Pole than it is today.
4. What is sea floor spreading?
5. What is the relationship between continental drift and earthquakes?
6. Describe the theory of plate tectonics in your own words.

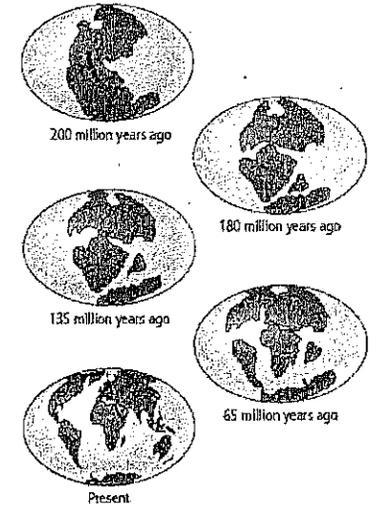
Understanding Key Ideas

7. Coal deposits form when plant matter sinks under water, begins to decompose, and is compressed. Explain how the presence of coal deposits in Siberia, northern Canada, and the Antarctic support the continental drift theory.
8. Despite the evidence Wegener found to support the continental drift theory, the scientific community of his day thought the idea of moving continents was ridiculous. What crucial question could Wegener not answer that might have changed other scientists' minds?

9. Why does the thickness of ocean floor sediments increase the farther they are from a ridge?
10. How does sea floor spreading explain the movement of tectonic plates?
11. Suppose a geologist is studying two distinct areas next to a spreading ridge. The magnetic direction of the minerals in the oldest area is opposite to the magnetic direction of minerals in the newest area.
 - (a) Which area is closest to the centre of the ridge, the older or newer area? Explain.
 - (b) What can the geologist conclude about Earth's magnetic field during the time when the two areas formed?
12. In a few sentences, explain how information from paleoglaciation and paleomagnetism support the idea that continental plates have moved over the past several million years.

Pause and Reflect

A marsupial is a type of mammal that carries its undeveloped young in an abdominal pouch. Scientists believe that many kinds of marsupials once lived throughout the world. Today, however, many marsupials are found only in Australia. How does the continental drift theory explain the modern distribution of marsupials? Use the diagram shown here to help you answer this question.



Bill Nye: Earth's Crust

Name _____ Date _____ Period _____

1. The Earth's _____ is a thin layer of rock that surrounds the Earth.
2. The layers of the Earth from the center are the _____, _____, and _____.
3. If the Earth were like an egg, the crust would be as thick as the _____.
4. Mt. St. Helens was erupting as the early settlers moved in from the year _____ until _____.
5. The "lava" was made in the laboratory by mixing _____ and _____ which produced _____ gas.
6. A _____ is like a volcano, except it is boiling water.
7. Tectonic is from the Latin word meaning _____.
8. _____ means "whole Earth".
9. Where the plates spread apart, we get _____.
10. Where the plates come together, we get _____.
11. North America is moving away from Europe about _____ inch(es) per year.
12. _____ are hollowed out spaces in the Earth's crust.
13. The Earth's core is _____ kilometers in diameter.

Continents Adrift: An Introduction to Continental Drift and Plate Tectonics

1. In the early 1900's, a German Scientist named _____ believed that the continents had once been joined into a super-continent called Pangea.
a) Isaac Newton
b) John Dalton
c) Alfred Wegener
d) Dmitri Mendeleev
2. The super-continent Pangea existed
a) 65 million years ago
b) 200 million years ago
c) 500 million years ago
d) 1 billion years ago
3. Evidence for continental drift includes:
a) The jigsaw puzzle fit of continents
b) Identical fossils were found in South America and Africa
c) Plant fossils were found in cold Arctic regions, where they could not live today
d) All of the above
4. The underwater mountain range that runs down the middle of the Atlantic ocean is called the:
a) The Great Spine of the Atlantic
b) Volcano Alley
c) The Seismic Range
d) The Mid-Atlantic Ridge
5. Scientists have discovered that, in the middle of the Atlantic Ocean, there is a crack and the sea floor is spreading. They found that:
a) Older rocks are located closer to the middle of the crack
b) Older rocks are located further away from the middle of the crack
c) Older rocks are mixed randomly with newer rocks near the crack
6. What evidence did scientists use to learn that the Earth's crust was broken into pieces?
a) Evidence from magnetic interference
b) Evidence from drilling into glaciers
c) Evidence from earthquakes
7. As the seafloor spreads, what is happening?
a) North America is moving **away** from Asia at a **divergent** plate boundary
b) North America is moving **away** from Asia at a **convergent** plate boundary
c) North America is moving **towards** Asia at a **divergent** plate boundary
d) North America is moving **towards** Asia at a **convergent** plate boundary
8. Sometimes when plates collide, one plate will go under the other. This is called:
a) Conduction
b) Induction
c) Subduction
d) Nanoduction

9. What happens at a **convergent** plate boundary?
- a) Plates crash into each other
 - b) Plates that carry oceans dive under plates that carry continents
 - c) Plates that carry continents dive under plates that carry oceans
 - d) Both "a" and "b" are correct
10. What happens at a **transform** plate boundary?
- a) Plates move towards each other
 - b) Plates move apart from each other
 - c) Plates slide past each other
 - d) None of the above
11. When two plates carrying continents collide, rock material is pushed up high into the air. This results in the formation of:
- a) mountains
 - b) icebergs
 - c) hurricanes
 - d) rainforests
12. What types of fossils have been found in almost every mountain range in the world?
- a) Fossils of saber-toothed tigers
 - b) Fossils of lystrosaurs
 - c) Fossils of sea life
 - d) Fossils of apatosaurs
13. What do scientists think will happen about 100 million years from now?
- a) All earthquake and volcano activity will stop
 - b) All magma within the Earth will cool and solidify
 - c) The continents will stop moving
 - d) The Earth will escape the sun's gravity and spin off into outer space

Summary Questions:

14. Describe, in your own words, some of the evidence for continental drift.

15. Name and briefly describe the 3 types of plate boundaries.