Chapter 4 Plate Tectonics

Study Guide

1. Earth's Interior
    a. Finding Indirect Evidence
        i. **Seismic Waves**
        ii. *What kind of indirect evidence do geologists use to study the structure of Earth?*
    b. A Journey to the Center of the Earth
        i. Temperature
        ii. **Pressure**
    c. The **Crust**
    d. The **Mantle**
        i. **Lithosphere**
        ii. **Asthenosphere**
        iii. *How does the material of the asthenosphere differ from the material of the lithosphere?*
    e. The Core
        i. **Outer Core**
        ii. **Inner Core**
    f. Earth's Magnetic Field
2. Convection Currents and the Mantle
    a. **Heat Transfer**
    b. **Radiation**
    c. **Conduction**
    d. **Convection**
        i. **Density**
        ii. **Convection Current**
        iii. *What is convection?*
    e. Convection in Earth's Mantle
3. Drifting Continents
    a. The Theory of Continental Drift
        i. **Pangaea**
        ii. **Continental Drift**
        iii. Evidence From Landforms

iv. Evidence From **Fossils**

v. Evidence From Climate

vi. *What were the three types of evidence Wegener used to support his theory of continental drift?*

b. Scientists Reject Wegener's Theory

4. Sea-Floor Spreading

a. Mapping the **Mid-Ocean Ridge**

i. **Sonar**

ii. *What device is used to map the ocean floor?*

b. Evidence for **Sea-Floor Spreading**

i. Evidence From Molten Material

ii. Evidence From Magnetic Stripes

iii. Evidence From Drilling Samples

iv. *What evidence did scientists find for sea-floor spreading?*

c. **Subduction** at **Deep-Ocean Trenches**

d. Subduction and Earth's Oceans

i. Subduction in the Pacific Ocean

ii. Subduction in the Atlantic Ocean

5. The Theory of **Plate** Tectonics

a. A Theory of Plate Motion

i. **Scientific Theory**

ii. **Plate Tectonics**

b. Plate Boundaries

i. **Faults**

ii. **Transform Boundaries**

iii. **Divergent Boundaries**

1. **Rift Valley**

2. *What is a rift valley? How are rift valleys formed?*

iv. **Convergent Boundaries**

1. *What types of plate movement occur at plate boundaries?*

c. The Continents' Slow Dance

Name _____ Date _____ Class _____

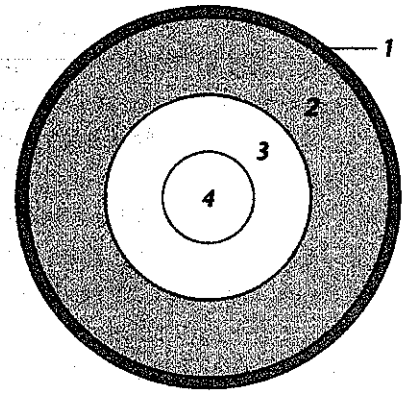
SECTION 4-1 REVIEW AND REINFORCE

Earth's Interior

◆ Understanding Main Ideas

Label the layers of Earth by writing the name of the layer in the blank.

1. _____
2. _____
3. _____
4. _____



Earth's layers

◆ Building Vocabulary

Match each term with its definition by writing the letter of the correct definition on the line beside the term.

_____ **5.** lithosphere	**a.** a soft layer in the mantle
_____ **6.** athenosphere	**b.** the force pushing on a surface or area
_____ **7.** pressure	**c.** a wave produced by an earthquake
_____ **8.** seismic wave	**d.** the rigid layer formed by the uppermost part of the mantle and the crust

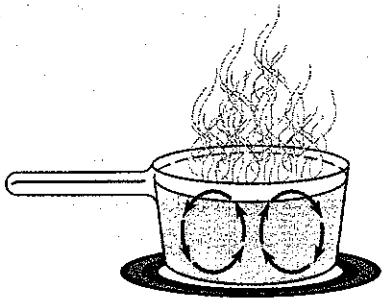
Name _____ Date _____ Class _____

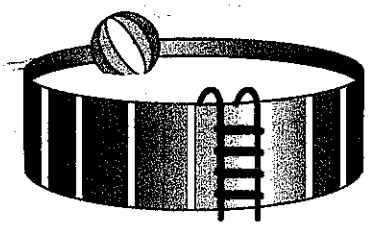
SECTION 4-2 REVIEW AND REINFORCE

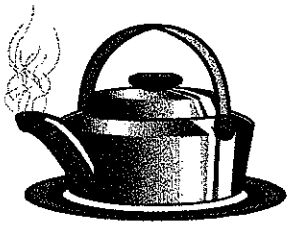
Convection Currents and the Mantle

◆ Understanding Main Ideas

Label each figure by writing the type of heat transfer it shows.







1. _____ 2. _____ 3. _____

Answer the following questions in the spaces provided.

4. What are convection currents and what causes them?

_____

_____

5. What causes convection currents in Earth's mantle?

_____

_____

◆ Building Vocabulary

If the statement is true, write true. If it is false, change the underlined word or words to make the statement true.

_____ **6.** The transfer of energy through empty space is called <u>convection</u>.

_____ **7.** The movement of energy from a warmer object to a cooler object is called <u>heat transfer</u>.

_____ **8.** <u>Conduction</u> is heat transfer by direct contact of particles of matter.

_____ **9.** <u>Radiation</u> is the transfer of heat by the movement of a heated fluid.

_____ **10.** Density is a measure of how much <u>heat</u> there is in a volume of a substance.

Name _____ Date _____ Class _____

SECTION 4-3 SECTION SUMMARY

Drifting Continents

◆ Understanding Main Ideas

Fill in the blanks in the table below.

Evidence for Continental Drift

Type of Evidence	Example of Evidence
Evidence from **1.** _____	**a.** Mountain ranges in South America and **2.** _____ line up **b.** European coal fields match with similar coal fields in North America
Evidence from Fossils	**a.** Fossils of the plant **3.** _____ found in rocks on widely separated landmasses
Evidence from **4.** _____	**a.** Fossils of tropical plants found near Arctic Ocean **b.** Scratches in rocks made by **5.** _____ found in South Africa

Answer the following questions on a separate sheet of paper.

6. State the hypothesis of continental drift.

7. Why did most scientists reject Wegener's theory for nearly a half century?

◆ Building Vocabulary

Fill in the blank to complete each statement.

8. All the continents were once joined together in a supercontinent called _____, meaning "all lands."

9. A(n) _____ is any trace of an ancient organism preserved in rock.

10. Wegener's theory that the continents slowly moved over Earth's surface became known as _____.

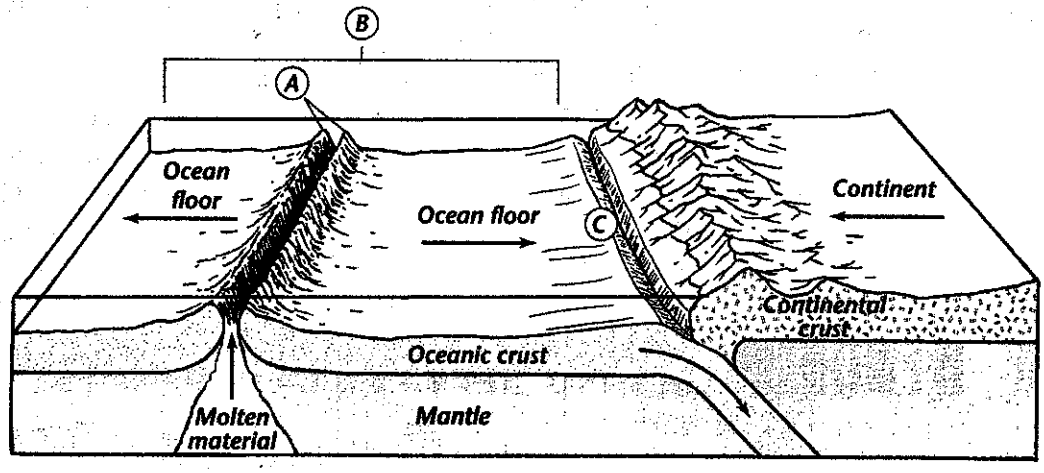
Name _____ Date _____ Class _____

SECTION 4-4 REVIEW AND REINFORCE

Sea-Floor Spreading

◆ Understanding Main Ideas

Use the figure below to answer the questions that follow. Answer the questions on a separate sheet of paper.



1. Name and describe the feature of the ocean floor shown at A.
2. Describe the process shown occurring at B, and explain what results from this.
3. What happens to old oceanic crust as new molten material rises from the mantle?
4. The arrows on the figure show the ocean floor spreading from the ridge. What are three kinds of evidence scientists have found to support this idea?
5. What process is shown occurring at C, and why does it occur?

◆ Building Vocabulary

Fill in the blank to complete each statement.

6. A device that scientists use to map the ocean floor is _____.
7. The feature on the ocean floor at C is called a(n) _____.
8. The geological process that continually adds new material to the ocean floor is called _____.
9. The geological process by which the ocean floor sinks into the mantle is called _____.
10. The chain of mountains that extends into all of the oceans on Earth is the _____.

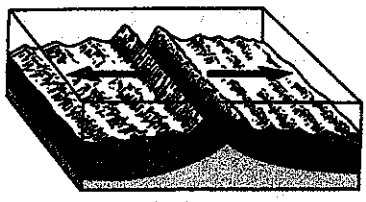
Name _____ Date _____ Class _____

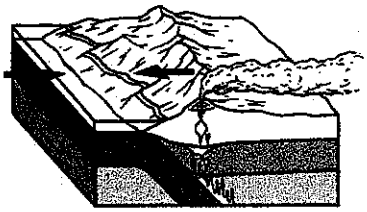
SECTION 4-5 REVIEW AND REINFORCE

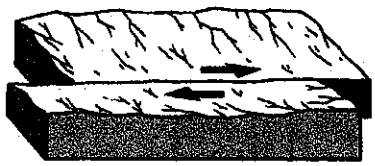
The Theory of Plate Tectonics

◆ Understanding Main Ideas

Label each figure by writing the type of plate boundary it shows.







1. _____ 2. _____ 3. _____

Answer the following questions on a separate sheet of paper.

4. Describe what happens when **a.** two plates carrying oceanic crust collide, **b.** two plates carrying continental crust collide, and **c.** a plate carrying oceanic crust collides with a plate carrying continental crust.
5. Explain what force caused the movement of the continents from one supercontinent to their present positions.

◆ Building Vocabulary

Fill in the blank to complete each statement.

6. A scientific _____ is a well-tested concept that explains a wide range of observations.
7. Breaks in Earth's crust where rocks have slipped past each other are called _____.
8. The lithosphere is broken into separate sections called _____.
9. A(n) _____ is a deep valley on land that forms along a divergent boundary.
10. The geological theory that states that pieces of Earth's crust are in constant, slow motion is called _____.

Name: _____

Class: Ch. 4 Review Earth Science

Choose the letter of the correct answer.

1. The process by which the ocean floor sinks through a deep-ocean trench and back into the mantle is known as

   [A] conduction. [B] subduction. [C] convection. [D] continental drift.

2. The place where two plates come together is known as a

   [A] convergent boundary. [B] rift valley.

   [C] divergent boundary. [D] transform boundary.

3. A place where two plates slip past each other, moving in opposite directions, is known as a

   [A] divergent boundary. [B] convergent boundary.

   [C] rift valley. [D] transform boundary.

4. A collision between two pieces of continental crust at a converging boundary produces a

   [A] deep-ocean trench. [B] rift valley. [C] mountain range. [D] mid-ocean ridge.

5. How did scientists discover that rocks farther away from the mid-ocean ridge were older than those near it?

   [A] by observing eruptions of molten material on the sea floor

   [B] by determining the age of rock samples obtained by drilling on the sea floor

   [C] by mapping rocks on the sea floor using sonar

   [D] by measuring how fast sea-floor spreading occurs

6. When the heat source is removed from a fluid, convection currents in the fluid will

   [A] eventually stop. [B] change direction.

   [C] continue at the same rate forever. [D] speed up.

7. Most geologists rejected Alfred Wegener's idea of continental drift because

   [A] Wegener used several different types of evidence to support his hypothesis.

   [B] Wegener was interested in what Earth was like millions of years ago.

   [C] they were afraid of a new idea.

   [D] Wegener could not identify a force that could move the continents.

Choose the letter of the correct answer.

8. The transfer of heat through space is called

   [A] subduction. [B] conduction. [C] convection. [D] radiation.

9. The geological theory that states that pieces of Earth's lithosphere are in constant, slow motion is the theory of

   [A] subduction. [B] deep-ocean trenches. [C] sea-floor spreading. [D] plate tectonics.

10. Earth's mantle is

    [A] a dense ball of solid metal. [B] a layer of molten metal.

    [C] a layer of rock that forms Earth's outer skin. [D] a layer of hot rock.

11. Which type of evidence was NOT used by Alfred Wegener to support his continental drift hypothesis?

    [A] evidence from fossils [B] evidence from climate

    [C] evidence from landforms [D] evidence from human remains

12. The mid-ocean ridge is

    [A] a long deep-ocean trench. [B] located mostly along coastlines.

    [C] the longest chain of mountains in the world. [D] found only in the Pacific Ocean.

13. What is the correct order (starting from the surface) of Earth's layers?

    [A] outer core, inner core, crust, mantle [B] crust, mantle, outer core, inner core

    [C] crust, outer core, inner core, mantle [D] mantle, outer core, inner core, crust

Fill in the word or phrase that best completes the statement(s).

14. Subduction occurs where the oceanic crust bends down toward the mantle at a _____.

15. Geologists learn about Earth's interior by studying _____, which move through Earth.

16. Wegener believed that the continents had once been joined in one landmass called _____.

17. In the asthenosphere, heat is transferred as soft rock flows slowly in cycles known as _____.

Fill in the word or phrase that best completes the statement(s).

18. Two of Earth's plates slip past each other, moving in opposite directions, along a _____ boundary.

19. An ocean plate plunges beneath a trench and back into the mantle in a process known as _____.

20. The energy from the sun that warms your face is transferred by a process called _____.

21. The process of _____ continually adds new crust to the ocean floor along both sides of the mid-ocean ridge.

If the statement is true, write true. If it is false, change the underlined word or words to make the statement true.

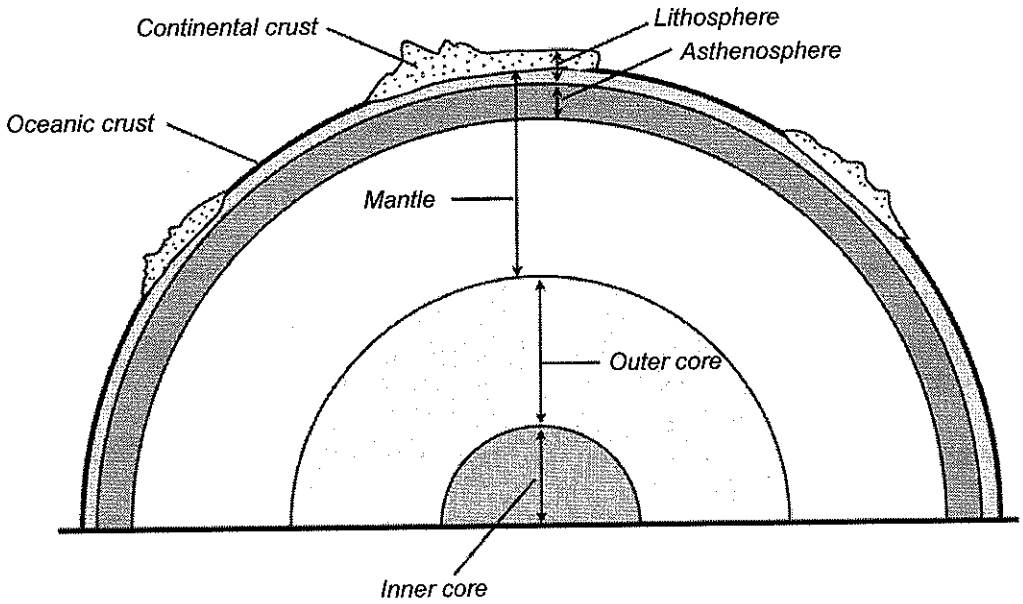
22. The mid-ocean ridge occurs along <u>transform</u> boundaries.

23. Alfred Wegener provided evidence from landforms and climate in support of his theory of <u>the shrinking Earth</u>.

24. Pressure <u>increases</u> from Earth's surface toward the center of Earth.

Use the diagram to answer the question(s).

Earth's Interior

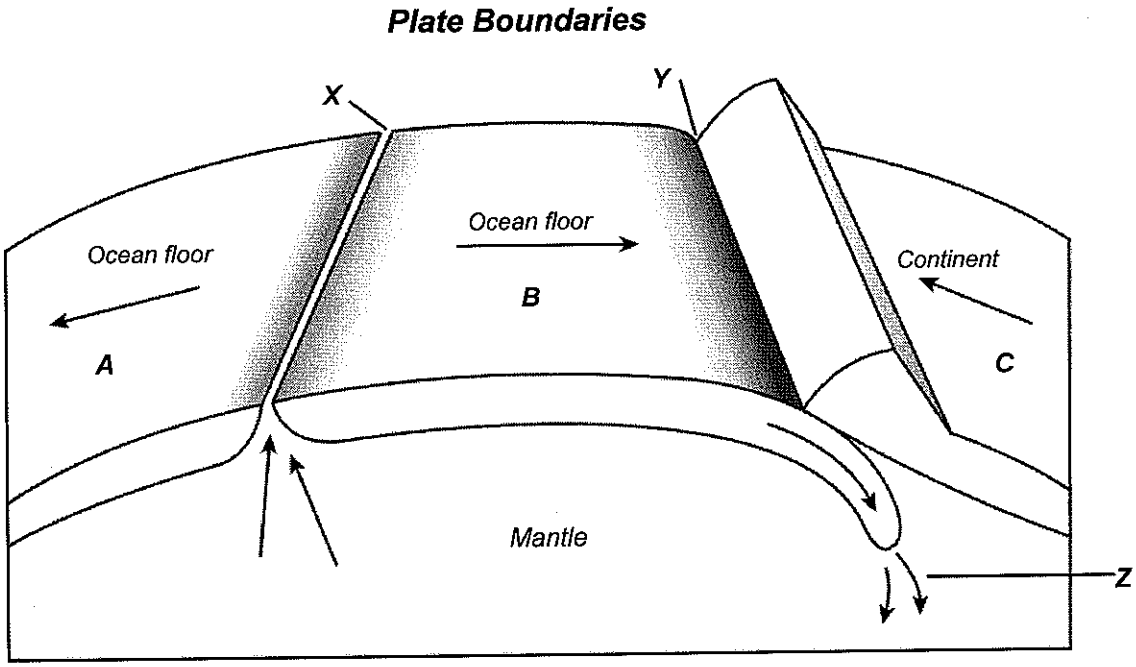


25. Which layer of Earth is made up partly of crust and partly of mantle material?

26. The asthenosphere is part of which layer of Earth?

27. Pressure increases with depth toward the center of Earth. In which layer would you expect pressure to be the greatest?

Use the diagram to answer the question(s).



28. What feature occurs at Y, and how does it form?

Write an answer to the following question(s).

29. Describe how the shapes of present-day continents support the theory of continental drift.

30. Describe the convection currents that occur inside Earth.

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