Earth's Interior (pp. 132–139)

This section explains how scientists learn about Earth's interior. The section also describes the layers that make up Earth and explains why Earth acts like a giant magnet.

Use Target Reading Skills

Preview the red heading Earth's Interior *and the blue subheadings* Evidence from Rock Samples, *and* Evidence from Seismic Waves. *Complete the graphic organizer below by answering the question that is asked about each heading.*

Earth's Interior

Heading	Question	Answer
Evidence from Rock Samples	What did scientists learn about Earth's interior by studying rock samples?	**a.**
Evidence from Seismic Waves	How did evidence from seismic waves help scientists learn about Earth's interior?	**b.**

Exploring Inside Earth (p. 133)

1. What prevents geologists from directly exploring Earth's interior?
extreme conditions

2. Geologists use direct evidence from Rock Samples to learn about Earth's interior.

3. Geologists learn about Earth's interior using indirect evidence from seismic waves.

4. Is the following sentence true or false? Geologists are able to drill to the center of Earth. False

5. Seismic waves reveal the structure of Earth through their speed and the paths they travel.

6. Circle the letter of each sentence that is true about Earth.
   a. Indirect evidence of Earth's interior comes from studying rock samples.
   b. Geologists cannot observe Earth's interior directly.
   c. It is over 6,000 kilometers from the surface to the center of Earth.
   d. Geologists learn about Earth's interior by drilling holes.

7. Seismic waves are produced by earthquakes.

A Journey to the Center of Earth (p. 134)

8. How does the temperature change as you go from the surface toward the center of Earth?
   Surface to 20 meters - stays same
   Then increases rapidly at first then more slowly but steadily

9. How does pressure change as you go from the surface toward the center of Earth?
   The deeper the greater the pressure

10. The three main layers that make up Earth are the crust, mantle, and core.

The Crust (p. 135)

11. The crust is a layer of rock that forms Earth's outer skin.

12. Is the following sentence true or false? The crust is thinnest under high mountains. false

13. The dark-colored rock that makes up most of the oceanic crust is basalt.

14. The light-colored rock that makes up most of the continental crust is granite.

Earth's Interior *(continued)*

The Mantle (pp. 136–137)

Match the name of each layer of the mantle with its description.

	Layer	Description
B	15. lower mantle	a. Rigid layer that includes the upper part of the mantle and the crust
A	16. lithosphere	b. Solid material beneath the asthenosphere
C	17. asthenosphere	c. Soft layer just below the lithosphere

18. Is the following sentence true or false? The asthenosphere is not considered solid because it can bend like plastic. False

19. Is the following sentence true or false? The mantle is nearly 3,000 kilometers thick. true

The Core (pp. 138–139)

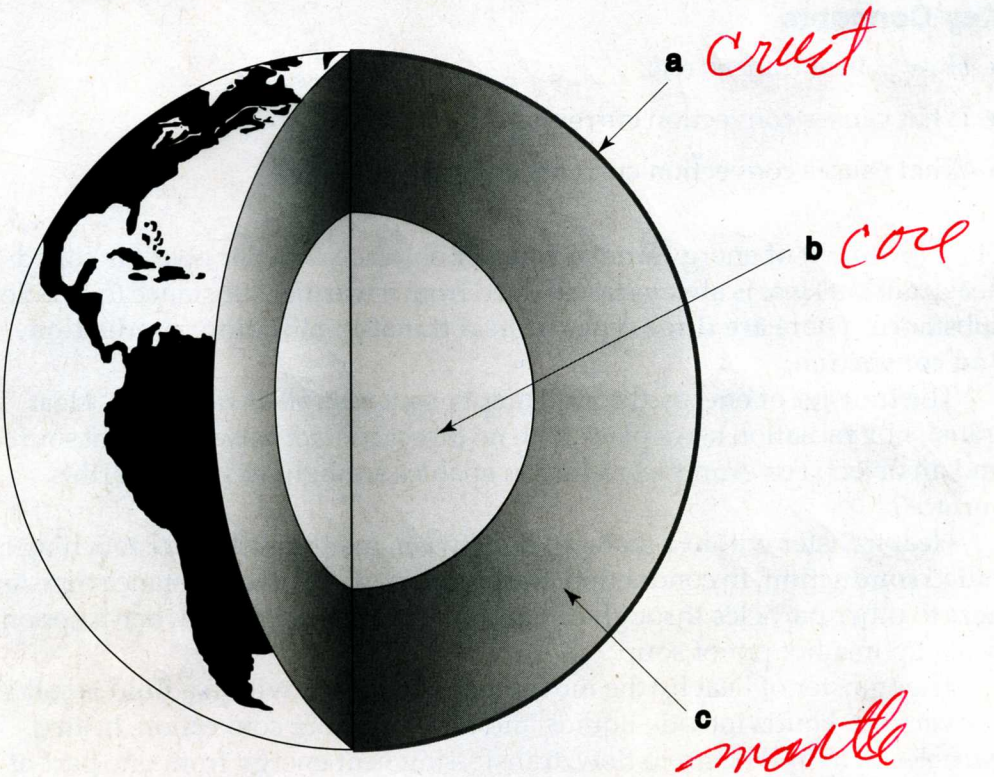
20. Circle the letter of each sentence that is true about Earth's outer core.

a. It is under low pressure.
b. It is made of solid metal.
c. It contains iron and nickel.
d. It is a solid.

21. Circle the letter of each sentence that is true about Earth's inner core.

a. It consists of molten metal.
b. It is a thick liquid.
c. It is not very dense.
d. It is under extreme pressure.

22. In the drawing, label the three main layers of Earth.



23. Describe how a compass needle aligns itself.

aligns w/ the lines of magnetic force

24. What creates Earth's magnetic field?

movement in the liquid outer core

Convection and the Mantle (pp. 140–143)

This section describes how heat is transferred from Earth's hot core through the mantle.

Use Target Reading Skills

As you read about heat transfer, complete the outline to show the relationships among the headings.

Convection in the Mantle
I. _____
A. _____
B. Conduction
C. _____
II. Convection Currents
III. _____
_____
_____

Types of Heat Transfer (pp. 141–142)

1. The movement of energy from a warmer object to a cooler object is called heat transfer.
2. List the three types of heat transfer.
   a. radiation b. convection c. conduction
3. What is radiation?
   transfer of energy thru space

Convection and the Mantle *(continued)*

4. What are two forms of radiation?
sunlight ; heat from a flame

5. What is conduction?
heat transfer between material touching

6. What is an example of conduction?
a metal spoon in a hot pot

7. What is convection?
heat by movement of currents

8. Heat transfer by convection is caused by differences of temp and density within a fluid.

9. A measure of how much mass there is in a volume of a substance is density.

10. Circle the letter of the sentence that describes what happens to a fluid when its temperature increases.

   a. Its particles occupy less space.
   b. Its density decreases.
   c. Its particles move more slowly.
   d. Its particles settle together more closely.

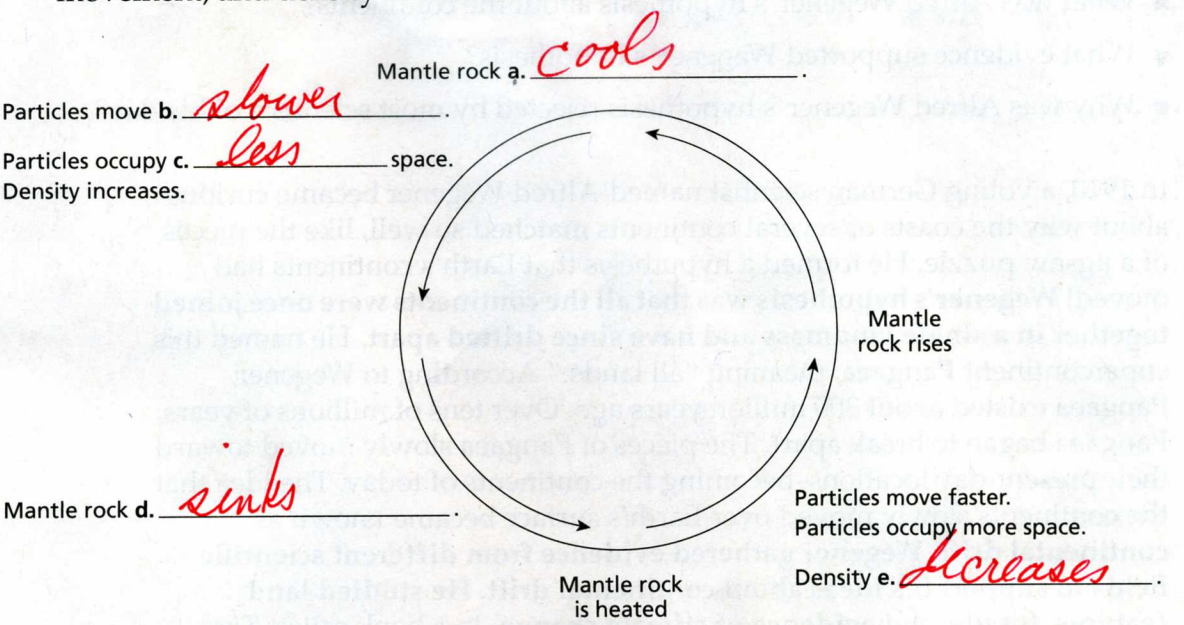
Convection Currents (p. 142)

11. What three factors set convection currents in motion?
heating + cooling ; density ; gravity

12. What happens to convection currents when the liquid or gas is no longer heated?
they stabilize + reach equilibrium ; stop

Convection Currents in Earth (p. 143)

13. Complete the graphic organizer to show the relationships among heat, movement, and density in mantle rock.



f. Why is this relationship shown as a cycle?

events occur over + over

g. In the cycle shown, where would mantle rock be the densest?

as it sinks to the bottom.

14. Is the following sentence true or false? The heat source for the convection currents in the mantle is the sun. false

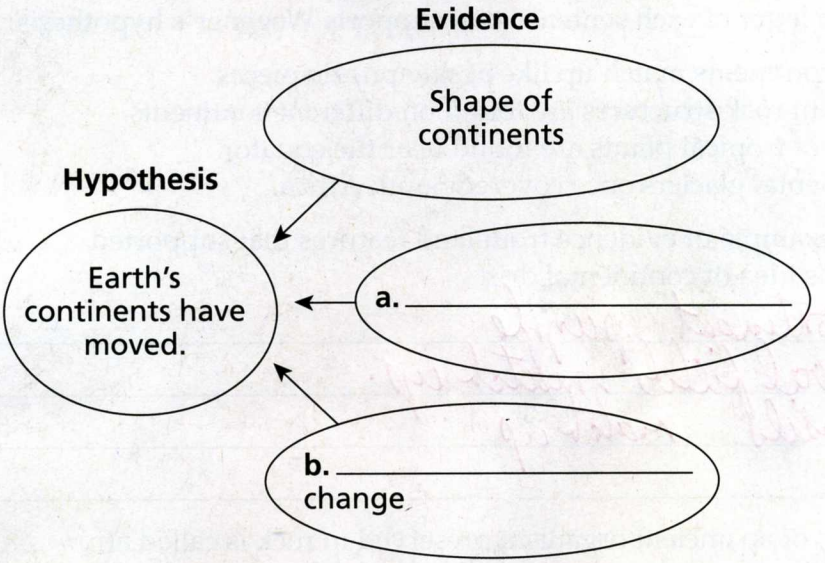
Drifting Continents (pp. 144–148)

This section describes a hypothesis of how the continents came to be located where they are today. The section also gives evidence for the hypothesis and explains why the hypothesis was not accepted for many years.

Use Target Reading Skills

As you read about the evidence that supports the hypothesis of continental drift, complete the graphic organizer.

Continental Drift



Continental Drift (pp. 145–147)

1. State Alfred Wegener's hypothesis about how Earth's continents have moved.

Pangea; broken up + drifted apart; moved by mantle convection currents.

2. Wegener named his supercontinent Pangea.

Drifting Continents *(continued)*

3. What did Wegener think had happened to this supercontinent?
broken apart into the continents of today.

4. Wegener's idea that the continents slowly moved over Earth's surface became known as Plate tectonics.

5. Circle the letter of each sentence that supports Wegener's hypothesis.

   a. Some continents match up like jigsaw puzzle pieces.
   b. Different rock structures are found on different continents.
   c. Fossils of tropical plants are found near the equator.
   d. Continental glaciers once covered South Africa.

6. Give an example of evidence from land features that supported Wegener's idea of continental drift.
1. continent puzzle
2. coal fields match up.
3. fossils match up

7. Any trace of an ancient organism preserved in rock is called a(n) fossil.

8. How did Wegener explain similar fossils on different continents?
They all lived on a single landmass

9. Is the following sentence true or false? Wegener believed that continental drift explained fossils of tropical plants found in places that today have a polar climate. TRUE

Wegener's Hypothesis Rejected (p. 148)

10. How did Wegener think that mountains formed?

Continents collide; mts formed by folds + uplifting

11. How do the locations of mountains support Wegener's idea about how mountains form?

Mt ranges usually along edges of continents where they are colliding

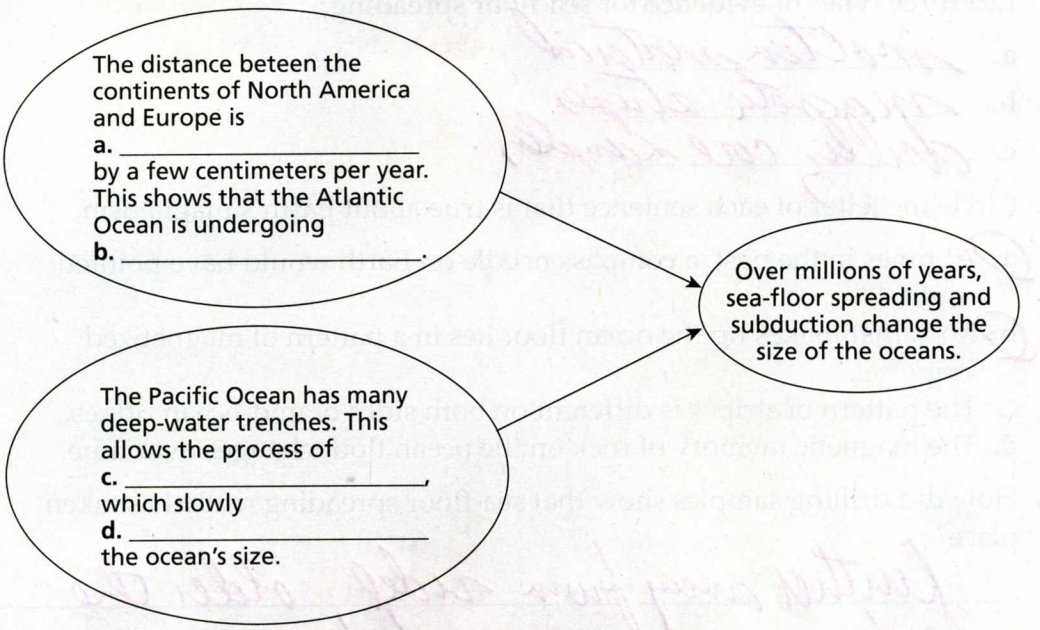
Sea-Floor Spreading (pp. 149–155)

This section explains sea-floor spreading and describes evidence supporting its occurrence. The section also explains subduction and describes how subduction affects Earth's oceans.

Use Target Reading Skills

As you read about the evidence that supports the hypothesis of sea-floor spreading, complete the graphic organizer.

Sea-Floor Spreading Results



Mid-Ocean Ridges (p. 150)

1. Circle the letter of each sentence that is true about mid-ocean ridges.

   a. The mid-ocean ridges were mapped using sonar.
   b. The mid-ocean ridges are found only below the Pacific Ocean.
   c. The mid-ocean ridges are completely under water.
   d. The tops of some mid-ocean ridges are split by a steep-sided valley.

2. A device that bounces sound waves off underwater objects is called sonar.

3. What is sonar used for? to determine the distance to an object

Sea-Floor Spreading *(continued)*

What Is Sea-Floor Spreading? (p. 151)

4. The process that continually adds new material to the ocean floor is called sea floor spreading.

5. In sea-floor spreading, where does new crust come from?
molten material erupts + cools down

Evidence for Sea-Floor Spreading (pp. 152–153)

6. List three types of evidence for sea-floor spreading.
   a. molten material
   b. magnetic stripes
   c. drilling core samples.

7. Circle the letter of each sentence that is true about Earth's magnetism.
   a. At times in the past, a compass needle on Earth would have pointed south.
   b. Rock that makes up the ocean floor lies in a pattern of magnetized stripes.
   c. The pattern of stripes is different on both sides of mid-ocean ridges.
   d. The magnetic memory of rock on the ocean floor changes over time.

8. How did drilling samples show that sea-floor spreading really has taken place?
farther away from ridge, older the rocks.

Subduction at Trenches (pp. 154–155)

9. A long, narrow and very deep canyon where the ocean floor bends down toward the mantle is called a deep ocean trench.

10. What is subduction?

plate sinks below another.

11. Complete the cause, events, and effect graphic organizer to show the relationships among the processes of convection currents, subduction, and sea-floor spreading.

a. Convection currents in Earths mantle

↓

b. sea floor spread.

↓ results in

The ocean is changed in c. age & shape

d. What process in Earth's interior causes subduction and sea-floor spreading?

convection currents in mantle.

e. What effect do those two events have on Earth's surface?

continental movement.

12. Is the following sentence true or false? At deep-ocean trenches, conduction allows oceanic crust to sink back into the mantle.

false

13. Is the following sentence true or false? The Pacific Ocean is shrinking.

true

14. Why is the Atlantic Ocean expanding?

sea floor spreading.

The Theory of Plate Tectonics *(continued)*

Introduction (p. 158)

1. The lithosphere is broken into separate sections called plates.
2. Is the following sentence true or false? Plates can carry continents or parts of the ocean floor but not both. false
3. What is a scientific theory?
well tested concept that explains observations

How Plates Move (p. 159)

4. State the theory of plate tectonics.
convection currents in the mantle
5. Is the following sentence true or false? The theory of plate tectonics explains the formation, movement, and subduction of Earth's plates.
true

Plate Boundaries (pp. 160–162)

Match the term with its definition.

	Term	Definition
B	6. plate boundary	a. Deep valley that forms where two plates pull apart
C	7. fault	b. Line where the edges of Earth's plates meet
A	8. rift valley	c. Break in Earth's crust where rocks have slipped past each other

9. Complete the compare/contrast table to explain how plates move at the different types of plate boundaries.

Plate Movement	
Type of Plate Boundary	**How Plates Move**
Spreading boundary	a. plates mov apart
Colliding boundary	b. plates smack togethe
Sliding boundary	c. slide past each other

d. How are the movement of plates at divergent boundaries and at sliding boundaries similar?

place on the surface move away from each other

10. Is the following sentence true or false? Crust is neither created nor destroyed along a sliding boundary. true

11. Most spreading boundaries occur along mid oceanic ridge.

The Theory of Plate Tectonics *(continued)*

12. When two plates collide, what determines which plate comes out on top?

less dense on top; more dense sinks

13. Circle the letter of each sentence that is true about colliding boundaries.

a. Where two plates carrying oceanic crust meet, subduction does not take place.

b. An oceanic plate sinks beneath a continental plate when the two plates collide.

c. Where two plates meet, the one that is more dense sinks under the other.

d. Mountain ranges form where two plates carrying continental crust collide.

14. Was Pangaea the only supercontinent to have existed? Explain your answer.

no, might have occurred over + over again.

15. Is the following sentence true or false? The pieces of the supercontinent Pangaea began to drift apart about 225 million years ago.

true

16. What does computer modeling show about the breakup of Pangaea?

the continents moved around.