

Chapter 8 Study Guide – Earthquakes

1. What is an earthquake?

Virbration of Earth produced by the rapid release of energy

2. What is released when an earthquake occurs?

Energy

3. What causes an earthquake?

Slippage along a break in Earth's crust

4. What is the elastic rebound hypothesis?

Explanation for the release of energy stored in deformed rocks (rocks spring back into their original place)

5. What are the 3 types of seismic waves? Describe how each wave moves. List in order from the greatest to the smallest strength of each wave. Which wave has the greatest speed? The slowest speed?

P-waves, S-wave, surface waves

P-waves: "push-pull" waves, they compress and expand rocks in the direction that waves travel

S-waves: shake particles at right angles to their direction of travel

Surface waves: up and down motion as well as side-to-side motion

Strongest: surface waves → body waves (P- and S-waves) : Weakest

Fastest: P-waves → S-waves → surface waves : Slowest

6. What is an epicenter? What is the focus? How are the two related?

Focus is the point within Earth where the earthquake starts. The epicenter is the location on the surface directly above the focus.

7. What is a seismograph? Explain how it works. What do the vertical lines indicate on a seismogram?

Instrument that records earthquake waves. A weight is suspended from a support attached to bedrock.

The movement is recorded on a rotating drum. Vertical lines represent time elapsed.

8. When determining the location of an earthquake, what do you need to know? Make sure you know how to locate an earthquake.

You need seismograms from three different locations. The S-P lag time can be used to determine the distance from the epicenter of the earthquake.

9. How is the fact that S and P waves travel at different speeds useful in determining the location of an earthquake?

Knowing the P-waves and S-waves travel at different speeds helps us to determine the location of an earthquake because the time between the arrival of a P-wave and the arrival of an S-wave can be used to calculate the distance to the epicenter of the earthquake.

10. Describe the make-up of the inner and outer core.

Outer core: 2260 km thick, metallic iron flows through this layer, creating Earth's magnetic field

Inner core: 1220 km thick, solid iron-nickel alloy (solid due to extremely high pressure)

11. How was this information gathered?

Studying seismic waves and knowing their properties. Changes in composition in each layer cause the path of the waves to bend. Also, P-waves travel through liquids and solids, whereas S-waves travel only through solids helped to tell which layers were liquid and which were solid.

12. At what depth does the outer core begin? At what depth does the inner core begin?

Outer core begins at a depth of around 2890 km. Inner core begins at a depth of around 5150 km.

13 Why is the inner core a solid at a higher temperature than the outer core at a lower temperature?

Inner core has extremely high pressure that causes the material to solidify even though it is at higher temperature than the outer core.

14. Describe the characteristics of Earth's mantle.

Solid, rocky shell that extends to a depth of about 2890 km. Rocks of lower mantle are still very hot and capable of gradual flow.

15. What is the boundary between the outermost layer of the earth and the mantle called? Who is it named after?

Moho; Croatian seismologist Andrija Mohorovicic

16. What are the two types of crust called? How are the types different?

Continental crust – lighter, more granitic rocks

Oceanic crust – heavier, basaltic rocks

17. Give the depths of all the Earth's layers.

Lithosphere – 5 – 250 km thick; Asthenosphere – about 600 km; Lower mantle – 2230 km; Outer core – 2260 km; Inner core - 1220 km

18. How does temperature and pressure change as you move deeper into the Earth? How does the temperature and pressure affect the properties of the material found in the Earth?

Temperature generally gets hotter as you move further under the surface of the Earth; The amount of pressure determines the state of matter of each layer (liquid or solid)

Chapter 9 Study Guide – Plate Tectonics

1. Who came up with the hypothesis of continental drift?

Wegener

2. What three types of evidence do we have to support continental drift?

Continental puzzle, matching fossils, rock types and structures, ancient climates

3. By finding identical fossils in Africa and South America, what does this suggest?

Africa and South America had once been joined together

4. Name the countries and continents glossopteris is found on.

South America, Australia, India and Antarctica

5. Explain why it is thought that the continents were once closer together (use glossopteris as your evidence).

Fossils were too large to be carried by the wind, too fragile to survive the ocean, too far between the continents – continents must have been connected at some point in the past

6. What does the presence of glossopteris in Antarctica suggest?

Antarctica's climate was different in the past vs. its current climate

7. List several pieces of evidence that supports continental drift (use rock evidence as support).

- Rock formations in Africa line up with matching formations in South America
- Folded Mountain chain stretches across South Africa and matches one in Argentina
- Coal fields with distinctive layers in Brazil match coal fields in South Africa
- Similar rocks and structures of the Appalachian Mountains can be found in the British Isles and Scandinavia

8. What evidence is there to suggest the continents were closer together (use climate evidence as support)?

- Glacial deposits found in warm climate --- therefore: areas were once closer to the poles
- Salt deposits in Northern States --- salt forms in tropical regions -- area was once warmer

9. What is the theory of plate tectonics?

- Links together ideas of continental drift and ocean floor spreading
- Explains how Earth has evolved over time
- Explains formations, movements, collision and destruction of the Earth's crust
- Provides framework for understanding:
 - - Mountains
 - - Volcanoes
 - - Earthquakes
 - - other land processes of the physical earth
 - - insights on how & why life on Earth has evolved
 - helps understand the past & predict the future

10. What are mid-ocean ridges? What goes on along the mid-ocean ridge?

An underwater mountain chain 70,000 miles long; Formed by the upwarping of the crust – over time rift valley fills with water and forms an ocean; new crust/lithosphere is created

11. What does the volcanic activity along the mid-ocean ridge lead to?

Underwater mountain chain

12. What is seafloor spreading? How does the ocean floor moving cause the continents to move?

Sea-floor spreading – spreading of the ocean floor; Process where new lithosphere is formed

13. Where are the youngest rocks found on the ocean floor? Where are the oldest rocks found?
Youngest –near mid-ocean ridge; oldest – towards the shore (furthest from mid-ocean ridge)
14. What are trenches? Where are they formed?
“crack” in the Earth’s crust/lithosphere created when one tectonic plate subducts beneath another plate; they are formed at oceanic-continental convergent boundaries and at oceanic-oceanic convergent boundaries
15. What are subducting plates? Why do they occur?
Subduction is where one plate is pulled down below the surface; one type of crust/lithosphere is more dense than the other (See #16 on Chapter 8)
16. Where are convergent boundaries found? Divergent boundaries? Transform fault boundaries?
Convergent boundaries – where tectonic plates come together; divergent – where tectonic plates move apart; transform – where plates grind past each other
17. What are the 3 types of convergent boundaries?
1) oceanic-oceanic, 2) oceanic-continental, 3) continental-continental
18. Give an example of a divergent boundary. Be specific.
Mid-Atlantic ridge
19. When oceanic-oceanic convergent boundaries occur, what are formed?
Ocean trench & volcanic island arc
20. When oceanic-continental convergent boundaries occur, what are formed?
Ocean trench & continental volcanic arc
21. Be able to explain the entire process of seafloor spreading.
See #12 above.
22. What is paleomagnetism? How does paleomagnetism explain the theory of plate tectonics?
the permanent magnetic field of a rock that shows the direction of the magnetic field at the time of the rock’s formation; rocks formed millions of years ago show the location of the Earth’s magnetic poles at the time of their formation
23. What does the theory of plate tectonics help us explain?
Seafloor spreading
24. How are earthquakes and their foci related to the location in a trench system?
Shallow earthquakes occur (have their foci) near or at the trench; Deep earthquakes occur (have their foci) toward the mainland
25. What are the causes of plate movements?
Convection/density differences; gravity
26. What is slab-pull? What is ridge-push?
Slab-pull: The pulling of old crust in the mantle because by the downward flow of more dense magma in the convection current
Ridge-push: The down-ward pull, from gravity, on the oceanic lithosphere at the ridge