

Directed Reading

Section: How and Where Earthquakes Happen

1. Define *earthquake*.

2. When do earthquakes usually occur?

3. What is a fault?

WHY EARTHQUAKES HAPPEN

_____ 4. Rocks along both sides of a fault are usually
a. not pressed together.
b. tightly pressed together.
c. loosely pressed together.
d. not touching.

_____ 5. What prevents rocks from moving past each other in a fault?
a. stress
b. energy
c. friction
d. weight

_____ 6. What is a fault that is in an immobilized state called?
a. rocked
b. locked
c. faulted
d. frozen

Directed Reading *continued*

- _____ 7. The trembling and vibrations of an earthquake are caused when
- a. the rocks become so pressed together that they shatter and release energy.
 - b. the friction is reduced so much that the rocks cannot move past each other.
 - c. the stress is reduced so much that the rocks of a fault suddenly break apart.
 - d. the stress becomes so great that the rocks of a fault suddenly slip past each other.
- _____ 8. Earthquakes are caused by
- a. elastic deformation.
 - b. elastic rebound.
 - c. elastic compression.
 - d. elastic waves.
- _____ 9. The sudden return of elastically deformed rock to its undeformed shape is called
- a. elastic rebound.
 - b. elastic decompression.
 - c. elastic compression.
 - d. elastic deformation.
- _____ 10. In the process of elastic rebound, rocks on each side of a fault
- a. are ground into gravel.
 - b. move quickly.
 - c. move slowly.
 - d. grind to a halt.
- _____ 11. What happens if a fault is locked?
- a. Stress in the rock decreases.
 - b. Rocks pull apart.
 - c. Rocks release energy.
 - d. Stress in the rock increases.
- _____ 12. When rocks are stressed past the point at which they can maintain their integrity, they
- a. fracture.
 - b. expand.
 - c. compress.
 - d. collapse.
- _____ 13. After the rocks fracture, what happens?
- a. The rocks collapse and fall back to their original shape.
 - b. The rocks rebound and spring back to their original shape.
 - c. The rocks are ground into gravel.
 - d. The rocks release their energy and disintegrate.

Directed Reading *continued*

14. The location within Earth along a fault where the first motion of an earthquake occurs is called the _____
- a. epicenter.
 - b. fault.
 - c. focus.
 - d. shadow.

15. Define *epicenter*.

16. About 90% of continental earthquakes have a shallow _____

17. Earthquakes that take place within 70 km of Earth's surface have _____ foci.

18. Earthquakes with intermediate foci occur at what depths?

19. Earthquakes with deep foci occur at what depths?

20. Where do earthquakes that have deep foci usually occur?

21. Why do earthquakes that cause the most damage usually have shallow foci?

SEISMIC WAVES

22. When rocks along a fault slip into new positions, they release energy in the form of vibrations called _____
- a. tidal waves.
 - b. elastic waves.
 - c. seismic waves.
 - d. focus waves.

Directed Reading *continued*

- _____ 23. Where do seismic waves travel?
- a. outward in all directions from the focus through the surrounding rock
 - b. inward in all directions from the epicenter through the surrounding rock
 - c. outward in all directions from Earth's core through its surface
 - d. inward in all directions from the focus through the epicenter

- _____ 24. How many main types of waves do earthquakes produce?
- a. three
 - b. six
 - c. two
 - d. ten

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|------------------------|---|
| _____ 25. body wave | a. a seismic wave that travels along the surface of a medium |
| _____ 26. surface wave | b. the fastest seismic wave; causes particles of rock to move in a back-and-forth direction parallel to the direction in which the wave is traveling; can travel through solids, liquids, and gases |
| _____ 27. P wave | c. the second-fastest seismic wave; causes particles of rock to move in a side-to-side direction perpendicular to the direction in which the wave is traveling; can only travel through solids |
| _____ 28. S wave | d. a seismic wave that travels through the body of a medium |

29. What are two other names for P waves?

30. What are two other names for S waves?

31. How do surface waves form?

32. What are the two types of surface waves called?

Directed Reading *continued*

33. Rock moves in what way as a result of a Love wave?

34. The ground moves in what way as a result of a Rayleigh wave?

SEISMIC WAVES AND EARTH'S INTERIOR

_____ 35. The composition of the material through which P waves and S waves travel affects

- a. the power and duration of the waves.
- b. the angle at which the waves travel.
- c. the speed and direction of the waves.
- d. the intensity and composition of the waves.

_____ 36. Through what type of materials do P waves travel fastest?

- a. materials that are not rigid and not easily compressed
- b. materials that are very rigid and not easily compressed
- c. materials that are not rigid and are easily compressed
- d. materials that are very rigid and are easily compressed

_____ 37. What did Croatian scientist Andrija Mohorovičić discover in 1909?

- a. The speed of seismic waves increases abruptly at about 30 km beneath the surface of continents.
- b. The speed of seismic waves decreases abruptly at about 30 km beneath the surface of continents.
- c. The speed of seismic waves increases abruptly at about 30 km above the surface of continents.
- d. The speed of seismic waves decreases abruptly at about 30 km beneath the surface of oceans.

38. List Earth's three main compositional layers.

Directed Reading *continued*

39. List Earth's five mechanical layers.

40. Define *shadow zone*.

41. Why do shadow zones exist?

42. What happens to seismic waves as they travel through materials of differing rigidities?

43. Why don't S waves reach the S-wave shadow zone?

44. How does a P-wave shadow zone form?

Directed Reading *continued*

EARTHQUAKES AND PLATE TECTONICS

In the space provided, write the letter of the description that best matches the term or phrase.

- _____ 45. tectonic plate boundary
 - _____ 46. convergent plate boundary
 - _____ 47. divergent plate boundary
 - _____ 48. continental plate boundary
- a. a boundary along which two continental plates converge, diverge, or move horizontally in opposite directions
 - b. a boundary along which plates move away from each other
 - c. an environment in which stress on rock is the greatest
 - d. a boundary along which plates move toward each other and collide

49. Why do earthquakes occur along mid-ocean ridges?

FAULT ZONES

- _____ 50. A fault zone is a region of
 - a. numerous closely spaced faults.
 - b. a few closely spaced faults.
 - c. Earth's core where the rocks form faults.
 - d. Earth's mantle where faults form.

51. Why do fault zones occur at plate boundaries?

52. What is the name of the fault zone that extends almost the entire length of Turkey?

Directed Reading *continued*

53. How did the New Madrid, Missouri, earthquakes in 1811 and 1812 differ from many other major earthquakes in the United States, in terms of their location?

54. What was discovered in the Mississippi River region in the late 1970s?

55. When did a major fault zone in the Mississippi River region of the North American plate form?
