

Earthquakes – Practice Questions and Answers
revised November 2008

1. Earthquakes are produced during:
 - (a) plastic failure within the mantle,
 - (b) brittle failure during faulting,
 - (c) mushrooming during folding
 - (d) none of the above

2. Seismic waves are waves of energy that:
 - (a) plastically distort the material that they pass through,
 - (b) permanently distort the material that they pass through,
 - (c) break the material that they pass through
 - (d) elastically distort the material that they pass through

3. The region of initiation of seismic energy within the Earth is called the:
 - (a) epicenter,
 - (b) hypocenter,
 - (c) area of greatest building damage
 - (d) area of least building damage

4. As rupture along a fault initiates, waves of energy travel outward from the hypocenter in a:
 - (a) linear fashion,
 - (b) a straight line path,
 - (c) a spherical fashion,
 - (d) none of the above

5. The position on the land surface immediately above the hypocenter is the _____.

6. Body waves emanate spherically from the focus traveling:
 - (a) entirely within the interior of the Earth,
 - (b) along the surface of the Earth,
 - (c) within the worlds oceans
 - (d) into space dude!

7. P-waves produce a series of:
 - (a) shearing motions that are at right angles to the direction of wave propagation,
 - (b) contractions and expansions that are in the direction of wave propagation,
 - (c) circular motions like an ocean wave
 - (d) snake-like motions parallel to the Earth's surface

8. S-waves produce a series of:
 - (a) contractions and expansions that are in the direction of wave propagation,
 - (b) snake-like motions parallel to the Earth's surface,
 - (c) circular motions like an ocean wave
 - (d) shearing motions that are at right angles to the direction of wave propagation
9. At a seismic station the first waves to arrive are _____.
10. At a seismic station the second waves to arrive are _____.
11. At a seismic station the last waves to arrive are _____.
12. Rayleigh waves move along the surface of the Earth forming a wave that is much like:
 - (a) a skier moving down a mountain hill,
 - (b) a car traveling through the sand dunes,
 - (c) an ocean wave
 - (d) a whale gliding along the ocean's surface
13. Love waves displace Earth material in a horizontal _____ motion.
14. _____ waves are the most destructive to buildings.
15. A seismograph is a device used to:
 - (a) sound an alarm,
 - (b) prevent earthquakes from occurring,
 - (c) record the vibrations produced during an earthquake
 - (d) calm the seismologist during an earthquake
16. On a seismic record, the S-P time interval is the _____ in arrival time between the P- and S-waves.
17. From the S-P interval a seismologists can determine the _____ to an earthquake.
18. Given three differently located seismic stations, the time-travel graph can be used to determine the position of the _____.
19. The Richter magnitude scale is determined by the amplitudes of the P- and S-waves at a distance of _____ km from the center of the earthquake.
20. The Richter magnitude scale is logarithmic with commonly reported magnitudes varying from ____ to ____.
21. Each unit increase in magnitude on the Richter scale corresponds to an increase in seismic wave amplitude of ____-fold?

22. How big an increase in energy is released in going from one Richter magnitude unit to the next?

23. A Richter magnitude 3 earthquake releases how many times the energy of a magnitude 1 earthquake?

24. The seismic moment is represented by what parameter in the following equation?

$$M_o = \mu Sd$$

25. In the following equation what are μ , S , and d ?

26. What does M_w in the following equation represent?

$$M_w = 2/3 \log_{10}(M_o) - 10.7$$

27. Which of the following classes represent earthquakes with magnitudes between 4 and 4.9?

- (a) moderate
- (b) great
- (c) strong
- (d) light
- (e) minor

28. Which of the following classes represent earthquakes with magnitudes between 6 and 6.9?

- (a) moderate
- (b) great
- (c) strong
- (d) light
- (e) minor

29. On a global scale, on average, over 900,000 earthquakes a year occur with magnitudes below

- (a) 6.0
- (b) 7.0
- (c) 2.5
- (d) 5.0
- (e) 4.0

30. Great earthquakes, on average, occur

- (a) 30,000 times annually
- (b) 500 times annually
- (c) 100 times annually
- (d) 20 times annually
- (e) once every 5 to 10 years

31. On what type of plate boundary would you expect mostly light to minor earthquakes?

32. On what type of plate boundary would you expect a great earthquake?

33. The modified Mercalli scale was developed to do what?

34. The modified Mercalli scale varies from ____ to ____.

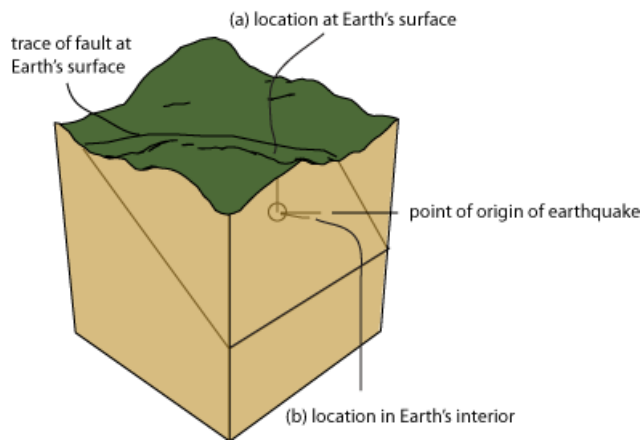
35. Mercalli indices of VI or lower measure the effects of an earthquake on

- (a) cows
- (b) dogs
- (c) horses
- (d) people
- (e) buildings

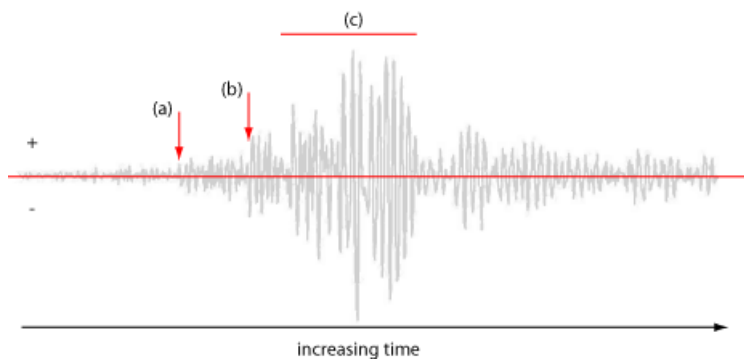
36. Mercalli indices of VII or higher measure the effects of an earthquake on

- (a) cows
- (b) dogs
- (c) horses
- (d) people
- (e) buildings

37. In the following illustration what do you call location (a) and location (b)?



38. In the following illustration what is happening at (a) and at (b)? What waves arrive over the interval labeled (c)?



Answers

1. (b) brittle failure during faulting
2. (d) elastically distort the material that they pass through
3. (b) hypocenter
4. (c) spherical fashion
5. epicenter
6. (a) entirely within the interior of the Earth.
7. (b) contractions and expansions that are in the direction of wave propagation
8. (d) shearing motions that are at right angles to the direction of wave propagation
9. P-waves
10. S-waves
11. surface waves
12. (c) an ocean wave
13. snake-like
14. surface
15. (c) record the vibrations produced during an earthquake
16. delay
17. distance
18. epicenter
19. 100
20. 1 to 9
21. 10
22. 32 times
23. 1024 times
24. M_o , in the equation $M_o = \mu Sd$ is the seismic moment
25. In the equation $M_o = \mu Sd$, μ is the shear strength, S is the surface area of rupture along the fault, and d is the average displacement along the fault.
26. M_w is the seismic moment magnitude or simply the moment magnitude
27. (d) light
28. (c) strong
29. (c) 2.5
30. (e) once every 5 to 10 years
31. divergent
32. convergent
33. measure the effects of earthquakes on buildings and people
34. I to XII
35. (d) people
36. (e) buildings
37. (a) = epicenter, (b) = focus or hypocenter
38. (a) = first arrival of P waves; (b) = first arrival of S waves; (c) = surface wave arrivals