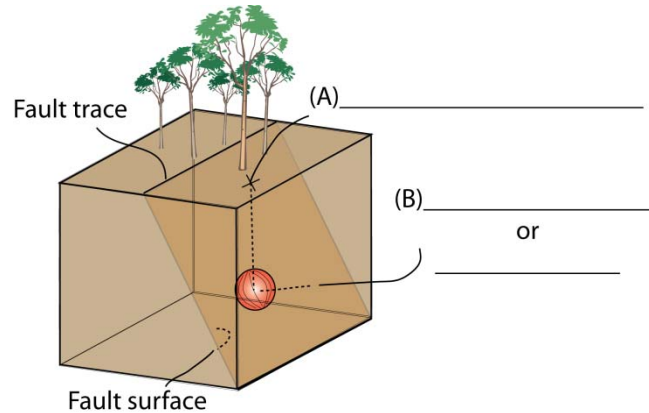


Chapter 6 – Earthquakes

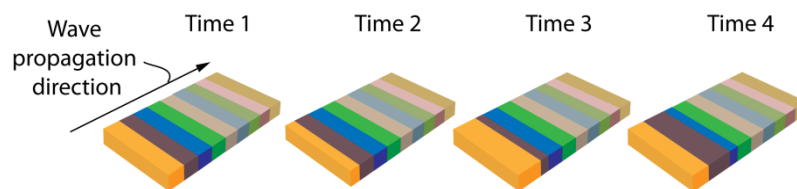
Practice Exam and Study Guide

1. What are earthquakes?
2. When rocks break during brittle failure, they release stored up elastic strain energy as _____ and _____.
3. As seismic waves pass through Earth material they _____ distort it.
4. Once a seismic wave has passed through Earth material what does it do?
5. Please fill in the missing labels for the following illustration.

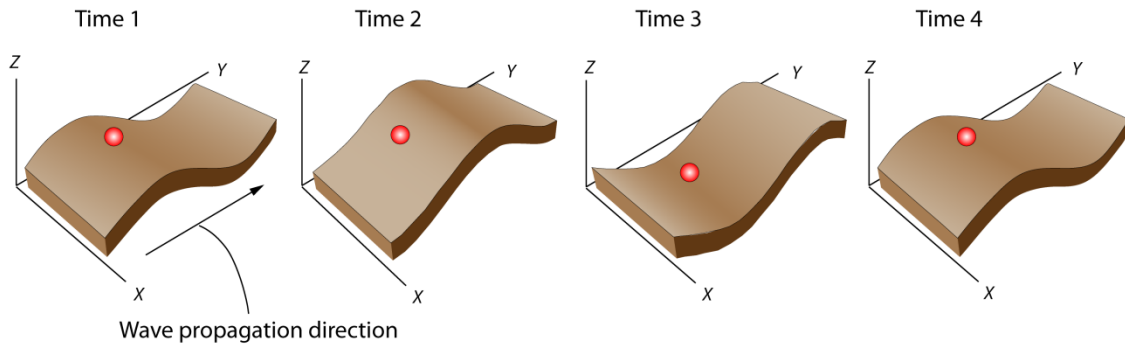


6. The point of initiation of an earthquake within the Earth's crust is called the _____ or _____.
7. The point lying on the Earth's surface vertically above the point of initiation of an earthquake in the Earth's interior is called the _____.
8. Seismic waves travel outward from the site of initial rupture along a fault in a _____ fashion.
9. Seismic waves are waves of energy produced by fault rupture. They grow _____ the further they are from the site of rupture.
10. What are the names of the two major groups of seismic waves?

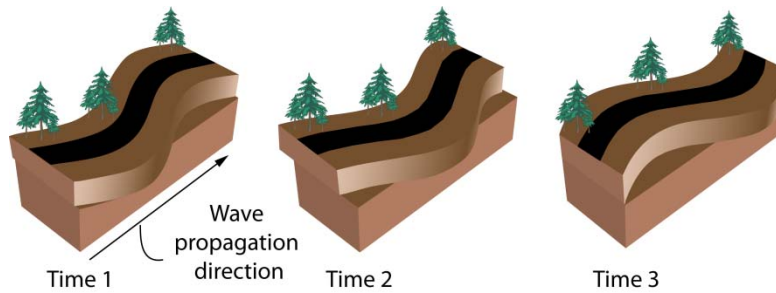
11. Body waves differ from surface waves in what way?
12. P-waves travel _____ than S-waves.
13. P-waves are a series of _____ and _____ in the direction that the wave is moving or propagating.
14. P-waves travel through _____, _____, and _____.
15. S-waves differ from P-waves as they produce _____ changes rather than volumetric changes.
16. Particles are displaced at _____ angles to the direction in which an S-wave propagates.
17. Liquids and gases can't support a shape change. Can S-waves propagate through such material?
18. Surface waves travel along the land surface. In this course we discussed two major varieties of surface waves. What are the names of these two major varieties of surface waves?
19. Rayleigh waves are said to resemble an _____ wave. One important characteristic of both ocean and Rayleigh waves is that they _____ with depth.
20. Love waves displace particles with a _____ motion in a plane parallel to the surface of the Earth.
21. What time of seismic wave is illustrated below?



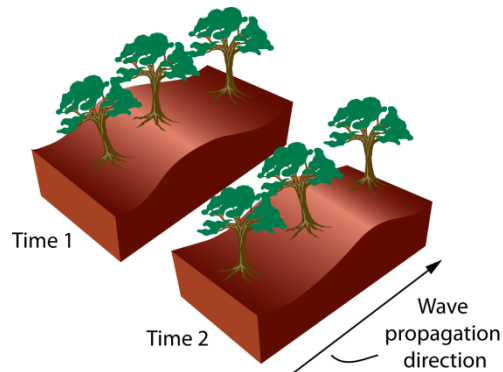
22. What type of seismic wave is illustrated below?



23. What type of seismic wave is illustrated below?

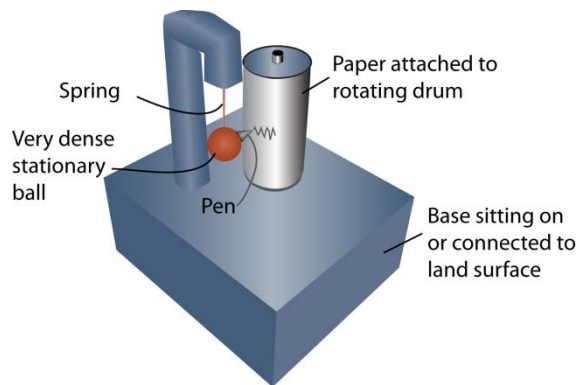


24. What type of seismic wave is illustrated below?

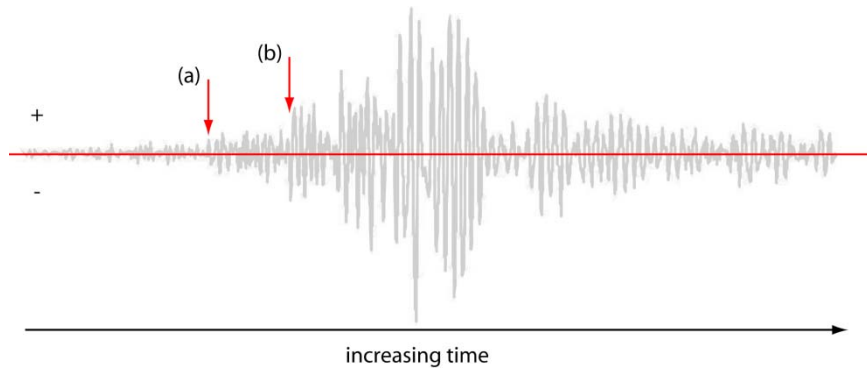


25. What types of seismic wave are most destructive to buildings?

26. What is the name of the device illustrated below?



27. For the following seismogram what do (a) and (b) represent?



28. In the illustration for question #27 what is the interval between (a) and (b) called?

29. What is the minimum number of seismic stations needed to find the epicenter of an earthquake?

- a. 1
- b. 2
- c. 3
- d. 4
- e. 5

30. What part of seismogram is used to determine the epicenter?
- The amplitude
 - The first arrivals of surface waves
 - The first arrival of P
 - The first arrival of S
 - The S-P interval
31. Given two seismic stations, one located at 1000 km and the other at 400 km from the epicenter of an earthquake. Would the S-P interval be larger or smaller at the station located 1000 km from the epicenter?
32. The Richter magnitude is determined by measuring the height of the peak amplitude on a seismogram derived from a Ward-Anderson seismometer. The size of the peak amplitude must be scaled to what distance from the epicenter?
- 25 km
 - 50 km
 - 75 km
 - 100 km
 - 125 km
33. The Richter magnitude scale is
- Geometric
 - Exponential
 - Logarithmic
 - Multiplicative
 - Viscoelastic
34. A Richter magnitude of 3 would be how many times larger than a magnitude 1 earthquake?
- 10
 - 100
 - 150
 - 200
 - None of the above

35. There is a 32-fold increase in energy in going from one Richter unit to the next. What is the energy difference in going from a magnitude 1 to a magnitude 3 earthquake?
- 32
 - 1024
 - 32,768
 - 1,048,576
 - None of the above
36. What does the equation $M_o = \mu Sd$ represent?
37. In the above equation what are the parameters μ , S , and d ?
38. What does the term M_w in the following equation represent $M_w = (2/3)\log_{10}(M_o)-10.7$?
39. Select from the following list the three largest recorded moment magnitudes.
- San Francisco, 1906
 - Chile, 1960
 - Alaska, 1964
 - Fort Tejon, 1887
 - Sumatra, 2004
40. A *great* earthquake will have a magnitude between
- 3-3.9
 - 4-4.9
 - 6-6.9
 - 8 or larger
 - 7-7.9
41. *Minor to light* earthquakes will have a magnitude between
- 3-3.9
 - 3-4.9
 - 6-6.9
 - 8 or larger
 - 7-7.9
42. *Strong to moderate* earthquakes are common in California. What is the range of magnitudes for such earthquakes?

43. Along what kind of plate boundary would you expect *major* to *great* earthquakes to occur?
44. How many earthquakes, on average, with magnitudes less than 2.5 occur globally ?
- 100,000
 - 500,000
 - 600,000
 - 900,000
 - 1,000,000
45. How often on a global scale do *great* earthquakes occur? Once every
- 1 – 5 years
 - 5 – 10 years
 - 5 – 20 years
 - 1 – 10 years
 - None of the above
46. The modified Mercalli scale was developed to measure the effect of an earthquake on _____ and _____.
47. The modified Mercalli scale varies from _____ to _____.
48. Mercalli scale indices of VI or lower measure the effects of an earthquake on _____.
49. Mercalli scale indices of VII and higher measure the effects of an earthquake on _____.

Answers

- Earthquakes are a shaking and vibration of the land surface.
- Heat, seismic waves
- Elastically
- It returns to its initial shape and volume
- (A) epicenter, (B) hypocenter or focus
- Hypocenter or focus
- Epicenter
- Spherical
- Weaker

10. Body and surface waves
11. Body waves travel through the Earth's interior while surface waves travel along the surface of the Earth.
12. Faster
13. Contractions, expansions
14. Solids, liquids, gases
15. Shape
16. Right
17. No
18. Raleigh and Love
19. Ocean, die out
20. Snake-like
21. P-wave
22. S-wave
23. Love wave
24. Rayleigh wave
25. Surface waves (i.e., Love and Rayleigh waves)
26. Inertial seismograph
27. (a) first arrival of P-waves, (b) first arrival of S-Waves
28. The S-P interval
29. c. 3
30. e. The S-P interval
31. It would be larger
32. d. 100 km
33. c. Logarithmic
34. b. 100
35. $32 \times 32 = 1024$ – the answer is b.
36. The moment of an earthquake
37. μ = the shear strength of the faulted rock, S = the area of the fault surface that ruptured, and d=the average displacement across the fault.
38. The moment magnitude
39. b. Chile, 1960, c. Alaska, 1964, e. Sumatra, 2004
40. d. 8 or larger
41. b. 3 – 4.9
42. 5 to 6.9
43. Convergent boundaries
44. d. 900,000
45. b. 5 – 10 years
46. people, buildings
47. I, XII
48. People

49. Buildings