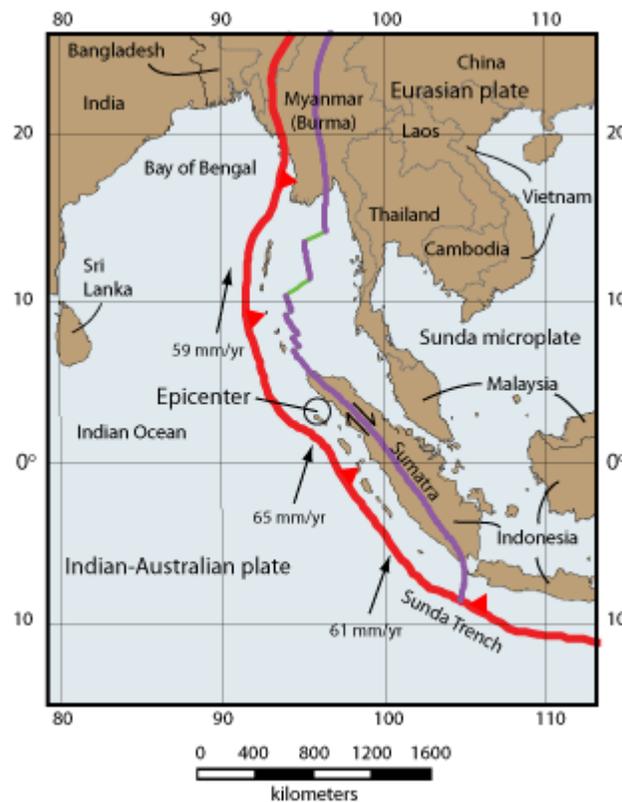


Tsunami – Practice Questions and Answers

Revised November 2008

1. What happened on 26 December 2004 off the west coast of Sumatra?
2. What is the final estimate of the magnitude of the Sumatra 26 December 2004 earthquake?
3. Given the following map, along what kind of a plate boundary did the 26 December 2004 earthquake occur?



4. How many people were estimated to have died in the December 2004 earthquake and tsunami?
5. How does NOAA define a tsunami?

6. What does tsunami mean in Japanese?
7. Are tsunami generated in the same manner as normal everyday ocean waves? Yes or No
8. Most major tsunamis are produced by earthquakes with magnitudes greater than
 - a. 6
 - b. 7
 - c. 8
 - d. 9
 - e. 5
9. Most major tsunamis are produced by earthquakes with hypocenters less than
 - a. 5 km
 - b. 10 km
 - c. 20 km
 - d. 30 km
 - e. None of the above
10. Most major tsunamis are generated by earthquakes along
 - a. Divergent margins
 - b. Convergent margins
 - c. Transform margins
11. Subduction along convergent margins is always continuous and smooth. Yes or No
12. When the interface between two converging plates sticks _____ build up.
13. What kinds of faults are common along convergent margins?
14. When the stress exceeds the resistance to shearing along the locked interface between two converging plates, what will happen?
 - a. The seafloor will suddenly subside
 - b. The seafloor will suddenly be driven upward
 - c. The seafloor will slide passively in a lateral direction parallel to the strike of the interface
 - d. Nothing will happen

15. If the seafloor is suddenly displaced upward, then what happens to the sea surface?
- It will subside
 - It will remain unchanged
 - It will momentarily rise
16. Is water compressible and does it have any strength?
17. If the sea surface is displaced upward, then how does it respond to gravity?
- It resists gravity and remains elevated
 - It responds to gravity and flows outward from the central area of disturbance as it attempts to regain its original flat undisturbed form.
18. During a tsunami a series of waves radiating outward from a central disturbance of the sea floor is called a
- Ocean storm
 - Wind-generated disturbance
 - Wave train
 - Wavelets
 - None of the above
19. Is the wavelength of a tsunami in the deep ocean greater or smaller than the typical wavelength of a wind-generated wave?
20. What is runup?
21. Just prior to a tsunami coming ashore, sea level appears to fall quickly. This phenomenon is called
- Sea level drop
 - Draw fall
 - Drawdown
 - Dip in sea level
 - None of the above
22. Does the period of a tsunami range from seconds to minutes or from minutes to up to 2 hours?
23. Does the speed of a tsunami increase or slow down as it enters the shallow water adjacent to a landmass lying in its path?

24. In the open ocean a tsunami can travel at speeds of
- 50 m/hour
 - 100 m/hour
 - 966 km/hour
 - 20 m/hour
 - 10cm/hour
25. As a tsunami approaches shallow water which of the following set of transformations occur?
- Wavelength increases, wave period decreases, and wave height stays the same
 - Wavelength decreases, wave period decreases, and wave height increases
 - Wavelength decreases, wave period increases, and wave height increases
 - Wavelength decreases, waver period stays the same, and wave height increases
26. If the average depth of the oceans is 3500 meters, then what would the speed of a tsunami be in such open ocean conditions?
- 300 km/hour
 - 400 km/hour
 - 667 km/hour
 - 500 km/hour
 - 600 km/hour
27. In the following formula what is g and d ?
- $$\text{Speed} = (g * d)^{1/2}$$
28. The wave height of a tsunami is typically less than
- 0.1 m
 - 0.2 m
 - 1 m
 - 0.5 m
 - 0.3 m
29. Where did the Good Friday earthquake occur?
- Chile
 - Sumatra
 - California
 - Cascadia subduction zone
 - Alaska

30. What is the magnitude of the largest earthquake recorded by man?
- a. 9.0
 - b. 9.2
 - c. 9.3
 - d. 9.4
 - e. 9.5
31. How much uplift occurred during the Good Friday earthquake?
- a. 5 m
 - b. 10 m
 - c. 15 m
 - d. 25 m
 - e. 20 m
32. Why is the Good Friday earthquake important to Californians?
33. What are *great* earthquakes?
34. How many people died in California as a result of the tsunami created by the Good Friday earthquake?
- a. 7
 - b. 11
 - c. 15
 - d. 20
 - e. 25
35. Along the west coast of North America, the Cascadia subduction zone lies offshore of which of the following areas?
- a. California (the northern part)
 - b. Oregon
 - c. Washington
 - d. Alaska
 - e. Canada

36. How large was the January 26, 1700 earthquake that occurred in the Cascadian subduction zone?

- a. 8.3 – 9.5
- b. 7 – 8
- c. 8.5 – 9.3
- d. 8.7 – 9.2
- e. None of the above

37. What is the reoccurrence interval for great earthquakes in the Cascadia subduction zone?

- a. 100 – 200 years
- b. 300 - 500 years
- c. 300 - 600 years
- d. 300 - 400 years
- e. None of the above

Answers

1. A large magnitude earthquake occurred. It generated a tsunami that affected nearly all of the countries surrounding the Indian Ocean.
2. $9.3 M_w$
3. Convergent margin
4. More than 225,000
5. According to NOAA a tsunami is a set of ocean waves caused by the large, abrupt disturbance of the sea-surface.
6. Harbor wave
7. No, they are a distinct variety of wave
8. 7
9. 30 km
10. Convergent margins
11. No, the interface between the converging margins can stick.
12. When the interface between converging margins sticks, stresses build up.
13. Reverse or thrust faults are common along convergent margins
14. The seafloor will suddenly be driven upwards
15. It will momentarily rise.
16. Water is not compressible and it has no strength.
17. The displaced water column will respond to gravity by flowing outward from the central area of disturbance as it attempts to regain its original flat undisturbed form.
18. Wave train
19. Wavelengths of tsunami are significantly greater than those of common everyday wind-generated waves. For example, the wavelengths of tsunami vary from 100 m to over 500 km while everyday wind-generated waves have wavelengths that vary from around 100 to 200 m.
20. Runup is the maximum vertical height above normal high tide reached by a tsunami as travels over the land surface.
21. Drawdown
22. The periods of tsunami range from minutes up to 2 hours
23. The speed of a tsunami slows as it enters shallow water.
24. The speeds of tsunami in open oceans can reach up to 966 km/hour
25. As tsunamis enter shallow water their wavelength decreases, their periods remain constant, and their wave heights increase.
26. At average ocean depths, tsunami are expected to travel at speeds of about 667 km/hour
27. g is the acceleration due to gravity (9.81 m/sec) while d is the depth to the seafloor
28. Tsunami wave heights are typically less than about 1 m.
29. The Good Friday earthquake occurred in Alaska.
30. The largest earthquake recorded by man occurred in Chile. It had a $9.5 M_w$.
31. Up to 15 m of vertical uplift occurred during the Good Friday earthquake
32. The Good Friday earthquake generated a tsunami that traveled across the Pacific where it came ashore in Crescent City, California
33. Great earthquakes are those earthquakes with a magnitude greater than 8.0
34. Eleven people lost their lives in Crescent City as a result of the Good Friday tsunami.

35. The Cascadia subduction zone lies offshore of northern California, Oregon, Washington, and southern Canada.
36. The 1700 earthquake had a magnitude somewhere between 8.7 and 9.2.
37. The reoccurrence interval for great earthquakes in the Cascadia subduction zone is 300 – 600 years.