

Sample G-100 Midterm Exam - Part 1: Plate tectonics, structure of the Earth, and Earthquakes

Multiple Choice Questions:

1. Which of the following does NOT provide support for the theory of plate tectonics?
 - a. the formation of the Great Lakes
 - b. the location of folded mountain belts
 - c. oceanic structures (ridges, trenches, etc.)
 - d. the location of earthquakes
 - e. the location of volcanic activity

2. According to the plate tectonics theory, new crust is
 - a. generated from partial melting of the asthenosphere
 - b. the result of metamorphism
 - c. formed from extrusion of lava from the liquid core
 - d. the result of deposition of sediments along continental margins
 - e. all of these answers

3. Which of the following statements concerning patterns of magnetic reversals on the sea floor is NOT correct?
 - a. The succession of positive and negative polarity linear patterns going in either direction out from the crest of the oceanic ridge is similar to variations in positive and negative polarities of basalts on the continents of similar age range.
 - b. They trend perpendicular to the transform faults.
 - c. The linear trend of the major patterns cuts across the oceanic ridges.
 - d. The patterns are parallel to the oceanic ridge.
 - e. The linear patterns are symmetrical away from the crest of the oceanic ridges.

4. The youngest rocks of the oceanic crust are found.
 - a. in the deep trenches
 - b. near continental margins
 - c. along fracture zones
 - d. along the oceanic ridge system
 - e. in the abyssal depths of the oceans

5. Sediment on the ocean floor
 - a. thickens and thins toward the equator
 - b. is approximately the same thickness throughout the ocean basin
 - c. is thinnest near the continents
 - d. is thickest near subduction zones and thin or absent on mid-ocean ridges
 - e. is thickest in the rift valley and thinnest near the trenches

6. Plate tectonic theory postulates all of the following EXCEPT that
 - a. lithospheric blocks move
 - b. continental crust is younger than oceanic crust
 - c. continental crust can be broken into large fragments
 - d. old lithosphere is destroyed in subduction zones
 - e. new crust is created in rift zones

7. The Earth's magnetic field
 - a. causes orientation of magnetic minerals in any rock millions of years after the rock forms
 - b. apparently has never changed direction
 - c. is probably caused by convection in the mantle
 - d. has its poles in exactly the same location as the geographic poles
 - e. causes orientation of magnetic minerals during crystallization of a magma

8. In addition to continental North America, the North American plate includes the
 - a. eastern half of the Pacific Ocean crust
 - b. western half of the North Atlantic Ocean crust
 - c. Cocos plate
 - d. Nazca plate
 - e. East Pacific rise

9. The Andes Mountains are believed to be the result of
 - a. a part of the oceanic ridge system that slid under the continent
 - b. the drift of a part of the Himalayas across the Pacific
 - c. an enormous unconformity
 - d. the convergence of large lithospheric plates
 - e. lava welling up from the Peru-Chile trench

10. Which of the following is NOT a major process at convergent plate margins?
 - a. generation of magma
 - b. folding and thrust faulting
 - c. transform fault motion
 - d. deep-focus earthquakes
 - e. mountain building

11. Which of the following is NOT a major process at divergent plate boundaries?
 - a. tensional stress
 - b. eruption of lavas
 - c. normal faulting
 - d. deep focus earthquakes
 - e. shallow focus earthquakes

12. If the continental crust in one tectonic plate collides with the continental crust in another
 - a. formation of a folded mountain belt and thick crust will occur
 - b. subduction of one of the continents will occur
 - c. block faulting of the Basin and Range type will occur
 - d. formation of rift zones will occur
 - e. thinning of the crust will occur

13. The zone of plastic rock beneath the lithosphere is called the
 - a. stratosphere
 - b. thermosphere
 - c. magnetosphere
 - d. mantle
 - e. asthenosphere

14. The oldest oceanic lithosphere is about
 - a. 2.0 billion years old
 - b. 200 million years old
 - c. 20 million years old
 - d. 2.0 million years old
 - e. 200,000 years old

15. The movement of lithospheric plates
 - a. is so slow that it cannot yet be measured
 - b. proceeds at rates of several kilometers per year
 - c. proceeds at rates of several meters per year
 - d. proceeds at rates of several centimeters per year
 - e. proceeds at rates of several microns per year

16. In P (primary) waves, the particles in a rock body move
 - a. at a 45-degree angle to the direction in which the wave travels
 - b. in an elliptical pattern
 - c. back and forth parallel to the direction in which the wave travels
 - d. back and forth at right angles to the direction in which the wave travels
 - e. in a circle like sea waves

17. Earthquakes are caused by
 - a. convection in the lithosphere
 - b. faults in the lower mantle
 - c. the focus of magma in the mantle
 - d. folding and plastic deformation during mountain building
 - e. ruptures that occur where rocks are strained beyond their elastic limits

18. The most intense and widespread zone of earthquake epicenters occurs
 - a. along convergent plate margins
 - b. along continental rift zones
 - c. within the plates
 - d. along divergent plate margins
 - e. along transform fault boundaries

19. Which of the following is NOT an accurate statement regarding the relationship of plate tectonics and earthquakes?
 - a. Most earthquakes occur in the lithosphere.
 - b. The motion of faults that create earthquakes along plate margins may be used to indicate the direction of plate movement.
 - c. Most earthquakes occur in narrow belts that coincide with tectonic plate boundaries.
 - d. Mid-oceanic ridges are characterized by deep focus earthquakes.
 - e. Earthquakes at convergent plate boundaries define a zone inclined downward beneath the continent or island arc.

20. Most of our knowledge of the interior of the Earth comes from
 - a. information derived from deep oil wells
 - b. density measurements
 - c. deep mines
 - d. the behavior of seismic waves passing through the Earth
 - e. meteorites

21. The major units of the Earth's interior, from deep to shallow, are
- liquid inner core, liquid outer core, asthenosphere, lithosphere
 - solid inner core, liquid outer core, asthenosphere, lithosphere
 - liquid inner core, solid outer core, mantle, lithosphere
 - liquid inner core, solid outer core, lithosphere, crust
 - solid inner core, liquid outer core, mantle, crust
22. Which characteristics best describe S waves?
- first to arrive, push-pull waves, move through the Earth's interior
 - second to arrive, move through the Earth's mantle, will not move through a liquid
 - third to arrive, do not move through the Earth's interior
 - last to arrive, travel along the surface
 - refracted waves, orbital motion similar to sea waves, will not move through a liquid
23. The outer boundary of the Earth's core is indicated by the shadow zone for
- surface waves
 - P waves
 - S waves
 - all of the above
 - both P and S waves
24. In general, the deepest earthquakes are associated with
- mid-ocean ridges
 - hot spots rising from the core-mantle boundary
 - convection in the molten core
 - subduction zones
 - the San Andreas fault
25. The Moho is the seismic discontinuity at the base of the
- lithosphere
 - crust
 - upper mantle
 - mantle
 - asthenosphere
26. Abrupt transitions in the physical properties of the mantle near 410 and 670 km depths, as indicated by abrupt changes in seismic velocities, probably reflect
- changes in the chemical composition of the mantle
 - simple compaction due to increase confining pressure
 - rapid increases in temperature
 - phase changes (changes in structure) of minerals in the mantle
 - none of these
27. The asthenosphere is
- the liquid portion of the core
 - a brittle portion of the lower crust
 - a brittle portion of the mantle
 - the elastic portion of the mantle

28. The mantle
- includes the entire lithosphere
 - is chemically distinct from the core
 - is largely molten
 - was discovered by drilling of deep holes
29. The amplitudes of seismic waves can be used to
- calculate the magnitude of an earthquake
 - estimate the length of a fault trace
 - predict earthquakes
 - all of the above
30. The deepest earthquakes are found at what depths
- 300 km
 - 700 km
 - 3000 km
 - the inner core
 - the boundary between mantle and core
31. Oceanic lithosphere
- is made of alternating bands of rocks of different compositions
 - is made of alternating layers of igneous and metamorphic rocks
 - records magnetic "stripes" of normally and reversely magnetized rocks
 - moves gradually toward the mid-ocean ridges, where it is consumed
32. Present-day examples of spreading centers are
- the Himalayan chain and the Pacific Ocean Ridge
 - the Philippines and the Atlantic Ocean Ridge
 - the Aleutian chain and the Atlantic Ocean Ridge
 - the Red Sea and the Atlantic Ocean Ridge
 - the Persian Gulf and the Pacific Ocean Ridge
33. Present-day example(s) of convergent plate boundaries are
- the Himalayas
 - the Alps
 - the Philippines
 - Japan
 - All of the above
34. What is the likely cause of plate motion?
- convection in the mantle
 - switching of the magnetic poles, which creates a disturbance in magnetic minerals
 - gravity anomalies
 - none of the above
 - all of the above
35. The epicenter of an earthquake is calculated using
- P wave arrival times at 3 or more different locations
 - S wave arrival times at 3 or more different locations
 - the sum of P and S wave arrival times at 3 or more different locations
 - the difference between P and S wave arrival times at 3 or more different locations

36. The major mass of magma and crust produced on the Earth occurs at
- subduction zones
 - Mid-ocean ridges
 - hot spots
 - volcanic arcs
 - orogenic zones
37. Which of the following is the longest mountain chain?
- Mid-Atlantic Ridge
 - Himalayas
 - Alps
 - Rocky Mountains
38. Early paleomagnetic studies suggested that the magnetic North Pole has moved around significantly in the past. This was later found to be untrue because
- the polarity had "flipped"
 - the measurements were incorrect
 - calculation failed to account for the Earth's curvature
 - polar wander paths from various continents differed due to continental drift
 - all of the above
39. You are sampling a series of basalt flows on an oceanic island. 100 m.y. old lava flows have a vertical magnetic inclination, 50 m.y. old lava flows have a 45 degree magnetic inclination, and a recent lava flow has a horizontal magnetic inclination. You conclude
- The island moved from a pole at 100 m.y., to 45 degrees latitude at 50 m.y., to the equator today
 - The island moved from the equator at 100 m.y., to a pole at 50 m.y., then back to the equator today
 - The island moved from the equator at 100 m.y., to 45 degrees latitude at 50 m.y., to a pole today
 - none of the above
40. Further study shows that the 100 m.y. direction is pointing straight up
- At 100 m.y. ago, the lavas were at the South Pole
 - At 100 m.y. ago, the lavas were at the North Pole
 - At 100 m.y. ago, the lavas were at the equator
 - a or b could be true, depending if the magnetic field was normal or reversed at the time
 - none of the above