Chapter 02
Earth's Interior and Geophysical Properties

True / False Questions

1. Geologists study the composition of the Earth's crust using deep drill holes.
TRUE

2. The asthenosphere may be a partially melted crystal and liquid slush.
TRUE

3. Seismic tomography uses earthquake waves and computers to study cross sections of the mantle.
TRUE

4. The Moho separates the crust from the mantle.
TRUE

5. The force of gravity between two objects decreases as the square of the distance between the objects increases.
TRUE

6. Seismic waves travel faster in oceanic crust than in continental crust.
TRUE

7. Generally, seismic wave velocity decreases with depth.
FALSE

8. Geologists think that the asthenosphere is molten.
FALSE

9. The composition of the upper mantle is the ultramafic rock peridotite.
TRUE

10. Most of the evidence for magnetic reversals comes from lava flows on the continents.
TRUE

11. The average density of the Earth is 2.7 gm/cm^3.
FALSE

12. The presence of an S-wave shadow zone implies that the Earth's core is liquid.
TRUE

13. The way that P-waves are refracted within the core suggests that there is a solid inner core.
TRUE

14. The average heat flow of the continents is the same as the average heat flow of the sea floor.
TRUE

15. The Earth's core is made up of equal parts cobalt and iron.
FALSE

16. A gravity meter can be used to explore for metallic mineral deposits.
TRUE

17. The concept of isostatic adjustment implies that all mountains extend to the same depth in the mantle.
FALSE

18. The rise of the surface of the crust after removal of glacial ice is known as isostatic rebound.
TRUE

19. A region held down out of isostatic equilibrium produces a negative gravity anomaly.
FALSE

20. The greatest negative gravity anomalies in the world are found over oceanic trenches.
TRUE

Multiple Choice Questions

21. _____ is the branch of geology that applies physical laws and principles to study Earth.
A. Earthquakology
B. Physicalogy
C. Geophysics
D. Palentology
E. Environmental geology

22. Recently, geologists have been analyzing ____ generated by tidal friction, ocean waves, and storms to gain an even more detailed image of the crust and upper mantle.
A. energy waves
B. light sources
C. water movement
D. evaporation
E. ocean currents

23. Detailed images provided by _____ suggest that the mantle is heterogeneous, probably due to variations in temperature, composition, and density.
A. p-waves
B. shadow zone
C. deep drill holes
D. seismic reflection
E. seismic tomography

24. _____ is a circulation pattern in which low-density material rises and high-density material sinks.
A. Conduction
B. Convection
C. Density flow
D. Refraction
E. Reflection

25. A ____ is a tool used to study the gravitational attraction between Earth and a mass within the instrument.
A. seismic reflection study
B. sonograph
C. gravitation recorder
D. seismograph
E. gravity meter

26. A region of magnetic force, called the _____ surround Earth.
A. magnetic force
B. magnetic field
C. magma field
D. magnetic poles
E. magnetism

27. A gravity reading lower than the normal regional gravity indicates that a region is ____.
A. actively being uplifted
B. under a high magnetic field
C. being held down
D. a good prospect for an ore deposit
E. undergoing elastic rebound

28. The study of ancient magnetic fields is called ____.
A. paleontology
B. old magnetism
C. Curie point
D. paleomagnetism
E. magnetic polarities

29. A deviation from average reading is called a(n) ____.
A. deviant
B. negative
C. anomaly
D. above or below average
E. positive

30. High _____ is usually an indication of a magma body or still-cooling pluton near the surface.
A. geothermal gradient
B. heat loss
C. convection
D. conduction
E. heat flow

31. The bending of seismic waves as they pass from one material to another is called seismic ____.
A. refraction
B. reflection
C. deflection
D. attenuation
E. waves don't bend when they pass through different materials.

32. The boundary that separates the crust from the mantle is the ____.
A. mantle discontinuity
B. Mohorovicic discontinuity
C. lithospheric discontinuity
D. athenospheric discontinuity
E. shadow zone

33. The crust and upper mantle form the ____.
A. lithosphere
B. athenosphere
C. core
D. outer core
E. Moho discontinuity

34. _____ is the return of some of the energy of a seismic wave to the Earth's surface after it bounces off a rock boundary.
A. Seismic reflection
B. Seismic refraction
C. Seismic attenuation
D. Seismic adjustment
E. Seismic shadow zone

35. Seismic P-waves _____ through continental crust relative to oceanic crust.
A. travel faster
B. travel slower
C. stay the same velocity
D. are refracted
E. are reflected

36. The upper mantle consists of _____.
A. granite
B. basalt
C. ultramafic rocks
D. metamorphic rocks
E. sedimentary rocks

37. What is the asthenosphere?
A. It is the surface that separates the crust from the mantle.
B. It is the zone that separates the continental crust from the oceanic crust.
C. It is in the surface that separates the inner and outer core.
D. It is the zone of weakness in the mantle on which the lithosphere moves.
E. It is the same as the Gutenberg Discontinuity.

38. The rise of the crust after removal of ice is called ____.
A. crustal rebound
B. tectonic uplift
C. upheaval
D. subduction
E. dynamic adjustment

39. Continental crust is ___ relative to oceanic crust.
A. the same thickness
B. thinner
C. thicker
D. hotter
E. of unknown relation

40. The P-wave shadow zone can be explained by the refraction of P-waves at the ___.
A. core-mantle boundary
B. asthenosphere-lithosphere boundary
C. Moho
D. inner core-outer core boundary
E. 670 km depth limit

41. Iron-nickel meteorites are an important source of information regarding the composition of Earth's _____.
A. oceanic crust
B. core
C. mantle
D. asthenosphere
E. continental crust

42. The ____ is the transition zone at the core-mantle boundary.
A. Moho
B. asthenosphere
C. D layer
D. perovskite zone
E. unnamed surface

43. ___ indicates that the core of the Earth is a liquid.
A. Density calculations
B. Studies of meteorites
C. The P-wave shadow zone
D. The S-wave shadow zone
E. The Earth's heat flow

44. At a pressure equivalent to a depth of 670 km the mineral olivine collapses to form ____.
A. perovskite
B. quartz
C. mica
D. calcite
E. zircon

45. The boundary between the core and the mantle is marked by great changes in ____.
A. seismic velocity
B. density
C. temperature
D. Both seismic velocity and density are correct.
E. Seismic velocity, density, and temperature are all correct.

46. Hot mantle rock rising slowly by convection under parts of the ocean explains ____.
A. mid-oceanic ridges
B. underwater volcanoes
C. the unexpectedly high heat flow under the oceans
D. the thickness of the continents
E. the location of earthquakes

47. _____ predicts that the higher a mountain range extends above sea level the deeper it extends into the mantle.
A. Isostatic adjustment
B. Crustal rebound
C. Mantle convection
D. Mohorovicic discontinuity
E. Subducting oceanic lithosphere

48. Oceanic crust is _____ continental crust.
A. thinner than
B. thicker than
C. the same thickness as
D. the same composition as
E. the same seismic velocity as

49. A cavity or body of low-density material causes a _____ pull on a gravity meter relative to average crust.
A. stronger
B. greater than the surrounding rock
C. weaker
D. rapidly increasing
E. Gravity can't be measured.

50. A gravity meter registers _____ over ore bodies.
A. zero gravity readings
B. constant gravity
C. decreased gravity
D. increased gravity
E. You can't explore for metallic deposits with a gravity meter.

51. As lava cools below the _____ point, a record of the Earth's magnetic field is permanently trapped in the rock.
A. freezing
B. burning
C. boiling
D. melting
E. Curie

52. The rock record for tens of millions of years indicates that the Earth's magnetic field ____.
A. reverses polarity about every 500,000 years
B. is constant in strength and polarity
C. did not come into existence until about 1 million years ago
D. is a monopole magnet
E. has steadily weakened and will be gone in another 10 million years

53. The ____ is a low velocity seismic zone.
A. asthenosphere
B. lower crust
C. core
D. outer core
E. Mohorovicic discontinuity

54. Heat flow _____ the crest of the mid-oceanic ridges.
A. increases away from
B. decreases away from
C. does not change relative to
D. is unknown on
E. is the highest on Earth on

55. The gradual loss of heat through the Earth's surface is called ___.
A. thermal decay
B. cooling trend
C. heat flow
D. thinning of the heat
E. convection

56. Because _____ can be accurately calculated, the size and shape of the core can be determined.
A. P-wave paths
B. surface wave paths
C. gravitational anomalies
D. heat flow conditions
E. magnetic anomalies

57. One widely accepted hypothesis is that the Earth's magnetic field is created by electric currents within the _____.
A. asthenosphere
B. crust
C. lower mantle
D. liquid outer core
E. sun

58. _____ is a balance or equilibrium of adjacent blocks of brittle crust floating on the upper mantle.
A. Density adjustment
B. Isostasy
C. Gravity adjustment
D. Inertial adjustment
E. Thermohaline flow

59. The average temperature increase in the shallow crust (the geothermal gradient) is about _____ degrees C per kilometer.
A. 2
B. 5
C. 10
D. 15
E. 25

60. The magnetic poles are displaced about _____ degrees from the geographic poles.
A. 5½
B. 11½
C. 16½
D. 30½
E. 45½