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MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The primary energy sources that make the Earth an active body include all but which of the following?
   A) The impact of extraterrestrial bodies
   B) Photosynthesis
   C) The Earth's internal heat
   D) Gravity
   E) The Sun

   Answer: B

2) The outward flow of Earth's internal energy over geologic time has produced our _____.
   A) atmosphere
   B) all of these are correct
   C) none of these are correct
   D) oceans
   E) continents

   Answer: B

3) The outward flow of Earth's internal energy over short time spans results in which of the following natural hazards?
   A) Magnetic storms
   B) None of these are correct
   C) All of these are correct
   D) Volcanic eruptions
   E) Mass movement

   Answer: D

4) The inner rocky planets include all but which of the following?
   A) Mercury B) Jupiter C) Earth D) Mars E) Venus

   Answer: B

5) The recognition of the Earth's great age was made by _____ upon observation of the features of the Scottish landscape.
   A) Albert Einstein
   B) William Wallace
   C) James Hutton
   D) William McDougal
   E) Isaac Newton

   Answer: C

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6) What is the meaning of Will Durant's (1885-1981) expression: "Civilization exists by geologic consents, subject to change without notice."?
A) Geologic consents are predictable in time and space.
B) Geologic processes never send us a signal or precursor.
C) We still don't completely understand geologic processes.
D) Geologic processes are usually very quick, so there's no time for humans to respond.
Answer: C

7) A Nebula is:
A) a rotating cloud of small solid particles
B) a rotating disk composed from helium and hydrogen
C) none of the choices are correct
D) a rotating cloud of atmospheric gases (nitrogen and oxygen)
E) a rotating cloud of heterogeneous materials, ice, gas and other solids
Answer: E

8) The main source of Earth's meteorites nowadays is/are:
A) rocky materials from Venus's surface
B) rocky materials from Mars's surface
C) meteorites from Jupiter's atmosphere
D) none of these are correct
E) the Asteroid belt
Answer: E

9) The decay product of parent material such as Carbon-14, is:
A) Nitrogen-14
B) Lead- 206
C) Uranium- 238
D) Argon- 40
E) Carbon- 12
Answer: A

10) When describing the layers of the Earth based on differentiation due to density, the inner core is a 2,450-km diameter _____ mass with temperatures up to 4,300C.
A) liquid B) gaseous C) solid
Answer: C

11) When describing the layers of the Earth based on differentiation due to density, the layer surrounding the core is the rocky _____ nearly 2,900 kilometres thick.
A) mantle B) chondrule C) crust
Answer: A

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12) When describing the layers of the Earth based on differentiation due to strength, which best describes the sequence of layers from the centre to the surface?
A) Core, mesosphere, lithosphere, asthenosphere
B) Core, asthenosphere, mesosphere, lithosphere
C) Core, mesosphere, asthenosphere, lithosphere
D) Core, lithosphere, asthenosphere, mesosphere
Answer: C

13) Many materials, like glacier ice and rocks, can _____.
A) fracture
B) all of these are correct
C) undergo ductile flow, changing their shape permanently
D) undergo small recoverable elastic deformation
E) none of these are correct
Answer: B

14) As radioactive atoms decay, energy is _____.
A) released
B) absorbed
C) neither absorbed nor released
D) may be absorbed or released, depending on which isotope is involved in the decay
Answer: A

15) Which of the following is true?
A) Nuclear energy from both places is from fission.
B) Nuclear energy from the sun is from fission whereas energy from radioactive isotopes decaying within the earth is from fusion.
C) Nuclear energy from both places is from fusion.
D) Nuclear energy from the sun is from fusion whereas energy from radioactive isotopes decaying within the earth is from fission.
Answer: D

16) The law of gravity states that two bodies attract each other with a force directly proportional to the product of their masses and inversely proportional to the _____ of the distance between them.
A) first power B) square C) square root D) cube
Answer: B

17) When large glacial ice mass is added onto land, land _____ and rock at depth flows _____ in the asthenosphere.
A) sinks, inward
B) lifts, outward
C) sinks, outward
D) lifts, inward
E) nothing will happened since land and rocks are rigid
Answer: C

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18) Which of the following natural hazards is not the direct result of the process of plate tectonics?
A) Volcanic eruptions
B) Earthquakes
C) Flooding
D) Mountain building

Answer: C

19) Which of the following is not a basic tenet of plate tectonics?
A) The new lithosphere slowly moves laterally away from the zones of oceanic crust formation on top of the underlying asthenosphere.
B) Melted asthenosphere flows upward as magma and cools to form new ocean floor lithosphere.
C) The slab pulled into the asthenosphere begins the process of reabsorption into the mantle.
D) The slab pulled into the asthenosphere begins the process of melting and moves into the liquid core.
E) When the leading edge of a moving slab of oceanic lithosphere collides with another slab, the denser slab turns downward and is pulled by gravity back into the asthenosphere (subduction), while the less-dense, more buoyant slab overrides it.

Answer: D

20) The time needed for a typical atom in an oceanic plate to complete a plate-tectonic cycle is _____.
A) about a hundred thousand years
B) about 10 million years
C) about a million years
D) about 4 billion years
E) in excess of 250 million years

Answer: E

21) Which of the following are incorrectly matched?
A) Transform plate boundary-Shear
B) Hot spot-Shear
C) Convergent zone-Compression
D) Continental rift zone-Tension
E) Divergent zone-Tension

Answer: B

22) The active triple junction in _____ Africa is geologically young, forming about 25 million years ago.
A) western
B) northeastern
C) southern
D) southwestern
E) southeastern

Answer: B

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23) The three basic classes of collisions include all but which of the following?
A) Oceanic plate versus continental plate
B) Oceanic plate versus oceanic plate
C) Continental plate versus continental plate
D) Mantle versus lithospheric plate
Answer: D

24) The grandest continental convergent zone in the modern world is the ongoing collision of _____.
A) the Africa plate by the South American plate
B) the North American plate by the Pacific plate
C) the Somalia plate by the Africa plate
D) the Africa plate by the Arabia plate
E) the Asia plate by the India plate
Answer: E

25) At which of the following locations does subduction occur?
A) Along collision zones between continental and oceanic plates
B) Along collision zones between two continental plates
C) At sea floor spreading zones
D) At rift zones
E) Above mantle hot spots
Answer: A

26) When oceanic lithosphere collides with another oceanic plate, the _____ in the process of subduction.
A) plates both disappear downward
B) plates pile up, forming mid-ocean ridges
C) younger, warmer plate goes beneath the older, colder plate
D) older, colder plate goes beneath the younger, warmer plate
Answer: D

27) The Himalayas are located at which of the following tectonic plate boundaries?
A) A hot spot
B) Divergent
C) Convergent
D) Transform
E) Subduction
Answer: C

28) The Hawaiian Islands are located _____.
A) above a midoceanic trench
B) above a hot spot in the mesosphere
C) above the midoceanic ridge
D) above a rift zone
E) above a midoceanic subduction zone
Answer: B

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29) All of the continents were once combined into a single supercontinent called _____.
A) Panthalassa
B) Laurasia
C) Gondwanaland
D) Tethys
E) Pangaea
Answer: E

30) Which of the following is attributed to the Canadian geophysicist J. Tuzo Wilson?
A) Discovery of magnetic reversal of the poles
B) Theory for hot spot volcanoes
C) Theory of continental drift
D) Discovery for slab-pull mechanism
E) Sea floor spreading hypothesis
Answer: B

31) After lava cools below the _____ point, about 550C, atoms in iron-bearing minerals become magnetized in the direction of the Earth's magnetic field at that time and place.
A) solidus
B) magnetization
C) Curie
D) critical
E) triple
Answer: C

32) If sea-floor spreading occurs at a constant rate, the widths of magnetized seafloor stripes have _____ ratios as the lengths of time between successive reversals of the Earth's magnetic field.
A) the same B) opposite C) triple D) critical E) two to one
Answer: A

33) The oldest rocks on the ocean floors are about _____ years in age because time needed to complete the tectonic cycle is more than _____.
A) 200 million; 250 million
B) 50,000; 60,000
C) 2 billion; 2.5 billion
D) 4.5 billion; 4.57 billion
E) 1 million; 2 million
Answer: A

34) As an observer moves away from the oceanic ridges, the seafloor volcanic rocks and islands _____.
A) do not change significantly in age
B) become progressively older
C) become progressively younger
Answer: B

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35) The hotspot-melting-through-lithosphere process forms lines of extinct volcanoes on the ocean floor, from youngest to oldest, _____.
A) with random ages along the lines
B) pointing in the opposite direction of plate movement
C) in a direction pointing toward the sun
D) pointing at 90 degrees to the direction of plate movement
E) pointing in the direction of plate movement
Answer: E

36) Moving progressively away from the ridges, the ocean water depths increase systematically with seafloor age due to all but which of the following?
A) Erosion of the older ocean floor by deep ocean currents
B) Cooling and contraction of the oceanic crust with a resultant increase in density
C) Isostatic down warping due to the weight of sediments deposited on the sea floor
Answer: A

37) The majority of the Earth's greatest earthquakes between 1900-2013 were caused by the _____.
A) subduction of the Pacific plate
B) subduction of the Nazca plate
C) divergence of the Australian and the Nazca plates
D) divergence of the Somali and the India plates
E) convergence of the India into the Arabian plates
Answer: A

38) The greatest earthquakes in the world occur _____.
A) in the interiors of individual plates
B) where plates slide past each other
C) where plates separate from one another
D) where plates collide with each other
Answer: D

39) Hot spots account of the eruption of approximately _____ of all magma.
A) 10%
B) 25%
C) 50%
D) 80%
Answer: A

40) Velocity of the plates depends on _____.
A) atmospheric pressure
B) hydrostatic pressure (thickness of the oceanic water)
C) combined atmospheric pressure and hydrostatic pressure
D) the properties of the mesosphere
E) the properties of the asthenosphere
Answer: E

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41) The stages in a model of a new developing sea are:
A) plate subduction, doming, rifting, and spreading.
B) centering, doming, rifting, and spreading.
C) none of the choices are correct.
D) centering, doming, rifting, and continental erosion.
E) hot spot, shield volcano, oceanic spreading, and trench developing.
Answer: B

42) The father(s) of plate Tectonics is(are) _____ and the proof for the concept comes from _____.
A) Marie Curie; parallel bands of magnetized rocks
B) Patrick Abbott and Susan Wilson; parallel bands of magnetized rocks
C) Claire Samson; water depth in oceans
D) Tuzo Wilson; alternating polarities of seafloor rocks
E) Alfred Hesse; chemical composition of continental rocks
Answer: D

43) When the oceanic plate subducts beneath Japan, a portion of the oceanic plate in the mesosphere generates earthquakes only at (in):
A) the periphery of the subducting oceanic plate
B) none of the choices are correct
C) the interior of the subducting oceanic plate
D) both periphery and interior of the subducting oceanic plate
E) the mesosphere, due to the rigidity of this zone
Answer: C

44) When you look at the list of Earth's Greatest Earthquakes (1900-2013) the dominant cause of earthquakes is(are):
A) worldwide rifting
B) subduction
C) hot spots
D) spreading of the plates
E) collision of the plates
Answer: B

45) Why are continent-continent collision zones not associated with volcanism?
A) The continental rock stacks into extra-thick masses, which act as a barrier to rising magma
B) They are relatively distant from the liquid outer core, which is a magma source.
C) They are not located at the plate boundaries.
D) None of the choices are correct
E) There is sliding between continents, which act as a lid
Answer: A

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TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

46) The two main constituents of the Sun are the lightweight elements hydrogen (H) and helium (He).
Answer: True False

47) The next four planets outward beyond Earth are Jupiter, Saturn, Uranus, and Neptune.
Answer: True False

48) Iron forms about one-third of the Earth's mass, and although it is much denser than ordinary rock, it melts at a much lower temperature.
Answer: True False

49) The centre of the Earth is composed of a dense, iron-rich core measuring about 7,000 km in diameter.
Answer: True False

50) Wrapped around the core is a nearly 2,900-km-thick, rocky mantle comprising 83% of the Earth's volume.
Answer: True False

51) Floating atop the hot, buoyant rock of the mantle is a mosaic crust of more dense rocks.
Answer: True False

52) During the last glacial period the weight of the ice sheet caused the land around Hudson's Bay to sink more than a kilometre.
Answer: True False

53) The Earth is comprised, from core to atmosphere, of density-stratified layers.
Answer: True False

54) The Earth's layering can be described either as 1) separations based on differing densities due to varying chemical and mineral compositions, or 2) layers with different strengths.
Answer: True False

55) Both temperature and pressure decrease continuously from the Earth's surface to the core.
Answer: True False

56) Increasing temperature causes rock to expand in volume and become denser and more capable of flowing under pressure.
Answer: True False

57) Increasing pressure causes rock to decrease in volume and become denser and more rigid.
Answer: True False

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58) The concept of isostasy applies a buoyancy principle to the low-density continents and mountain ranges that float on the less dense mantle below.
Answer: True False

59) The young Earth had a much larger number of radioactive isotopes but a much lower heat production from them than it does now.
Answer: True False

60) The oldest Earth rocks found to date are 4.03 billion years old in Northwest Territories of Canada.
Answer: True False

61) James Hutton revolutionized our understanding of the Earth by hypothesizing that the time required to shape the Earth was very great.
Answer: True False

62) Radioactive isotopes in rocks act as clocks that can be used to date the age of the igneous rock.
Answer: True False

63) Chondrules are small rounded stony meteorites approximately 10,000 years old.
Answer: True False

64) Rock is capable of flow only if increasing pressure and decreasing temperature are applied.
Answer: True False

65) The nuclear fusion in the Sun forms helium from splitting hydrogen atoms, this process also require some energy absorption.
Answer: True False

66) The breakup of Pangaea about 180 million years ago created two large continental masses, Laurasia and Gondwanaland.
Answer: True False

67) Pangaea covered 60% of the Earth's surface while Panthalassa covered the remaining 40%.
Answer: True False

68) The outer core is mostly liquid, and the viscous movements of convection currents within it are responsible for generating plate tectonics.
Answer: True False

69) The gigantic pieces of lithospheric plates diverging, sliding past, or colliding with each other are directly responsible for the vast majority of the earthquakes, volcanic eruptions, and mountains on Earth.
Answer: True False

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70) When data from the Earth's magnetic field locked inside seafloor rocks became widely understood, skeptics around the world were convinced that seafloor spreading occurs and that the concept of plate tectonics is valid.
Answer: True False

71) The floor of the Atlantic Ocean is striped by parallel bands of magnetized rock that show alternating polarities in a pattern that is symmetrical and parallel to the mid-ocean spreading centre.
Answer: True False

72) Subducted slabs completely melt in the core and mix with the surrounding magma at the centre of the Earth.
Answer: True False

73) The greatest mountain ranges on Earth lie on the ocean bottoms and extend more than 65,000 kilometres.
Answer: True False

74) The deep ocean trenches are the tops of the subducting plates turning downward to re-enter the asthenosphere.
Answer: True False

75) The distribution of several fossils on opposite sides of the Atlantic Ocean and the continuity of geologic structure on different continents suggests that all the continents were once part of Pangaea.
Answer: True False

76) The map of earthquake epicentres can be viewed as a connect-the-dots puzzle.
Answer: True False

77) The oldest seafloor rocks are found nearest the mid-ocean ridges.
Answer: True False

78) Hot spots have active volcanoes above them on the Earth's surface and moving plates carry the volcanoes away from their hot-spot source.
Answer: True False

79) Above the oceanic ridges, the ocean is relatively deep compared to further away from the ridges.
Answer: True False

80) The rates of plate movement are comparable to those of human fingernail growth.
Answer: True False

81) The divergent or pull-apart motion at spreading centres causes rocks to fail in tension, yielding mainly smaller earthquakes that do not pose an especially great threat to humans.
Answer: True False

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82) A slide-past motion occurs as rigid lithospheric plates fracture and move around the Earth in horizontal movements of transform faults, creating large earthquakes.
Answer: True False

83) The convergent motions that occur at subduction zones and in continent-continent collisions store immense amounts of energy that are released in Earth's largest earthquakes.
Answer: True False

84) When a continent is involved in a collision at a convergent plate boundary, it cannot subduct because its huge volume of low-density, high-buoyancy rocks cannot sink to great depth and cannot be pulled into the denser mantle rocks below.
Answer: True False

85) The fate of oceanic plates is destruction via subduction and reabsorption into the mantle, whereas continents float about on the asthenosphere in perpetuity.
Answer: True False

86) The precollision crusts of India and Asia were each about 35-km thick; after the collision, the combined crust has been thickened to as much as 100 km.
Answer: True False

87) A topographic and bathymetric map show the thickness of the ocean water above a trench and thickness of a mountain,
Answer: True False

88) Pascal Audet installed a seismic recording station in central Yukon because this is a seismically quiet area and earthquakes from distant areas such as the west coast of Costa Rica can be better studied.
Answer: True False

89) Japan and the Aleutian Islands of Alaska represent an island arc of volcanoes.
Answer: True False

90) The material of Tablelands Gros Morne National Park, Newfoundland was formed during oceanic plate versus oceanic plate collision.
Answer: True False

91) After the Indian plate with Euroasian plate collision, the huge mass of the Himalayas was formed and any further assault is stopped.
Answer: True False

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1) B
2) B
3) D
4) B
5) C
6) C
7) E
8) E
9) A
10) C
11) A
12) C
13) B
14) A
15) D
16) B
17) C
18) C
19) D
20) E
21) B
22) B
23) D
24) E
25) A
26) D
27) C
28) B
29) E
30) B
31) C
32) A
33) A
34) B
35) E
36) A
37) A
38) D
39) A
40) E
41) B
42) D
43) C
44) B
45) A
46) TRUE
47) FALSE
48) TRUE
49) TRUE
50) TRUE

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51) FALSE
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