

**Multiple Choice (50 pts). Please circle the letter that best answers the question or completes the sentence.**

1. Banded Iron Formations, found on every continent, are significant because they indicate which of the following?
  - A. The best location for mining iron sulfide ore deposits
  - B. The onset of hard-shelled organisms
  - C. The initial buildup of oxygen in the atmosphere
  - D. The K-T Boundary
  
2. The Sahara of Africa is a desert primarily because it is located \_\_\_\_\_.
  - A. in the subtropics
  - B. within the rain shadow of a mountain range
  - C. near the center of a large continent
  - D. located next to a cold ocean current
  
3. A rock that has been abraded by windborne particles on multiple faces, forming a sharp edge in between is termed a \_\_\_\_\_.
  - A. blowout
  - B. ventifact
  - C. wadi
  - D. yardang
  
4. The most recent interval of Quaternary glaciation gave way to warmer, interglacial conditions \_\_\_\_\_ ago.
  - A. 1 million years
  - B. 200,000 years
  - C. 75,000 years
  - D. 11,000 years
  
5. In the North American interior, sedimentary sequences dominated by fossiliferous limestone were deposited
  - A. early and middle Paleozoic
  - B. late Paleozoic
  - C. early and middle Cenozoic
  - D. late Cenozoic
  
6. Where would you expect to see solifluction?
  - A. Mexico
  - B. Italy
  - C. Egypt
  - D. Siberia
  
7. When did the human genus, Homo, first appear on the Earth?
  - A. 200 million years ago
  - B. 2.4 million years ago
  - C. 100,000 years ago
  - D. 10,000 years ago
  
8. Which sequence of coal ranks is ordered from lowest to highest?
  - A. anthracite, peat, bituminous, lignite
  - B. peat, lignite, bituminous, anthracite
  - C. bituminous, lignite, peat, anthracite
  - D. peat, bituminous, anthracite, lignite
  
9. Uniformitarianism is succinctly summarized by which phrase?
  - A. The future is the key to the present.
  - B. The present is the key to the past.
  - C. The past is the key to the present.
  - D. The present is the key to the future.
  
10. The Hadean is a time in Earth history when \_\_\_\_\_.
  - A. the first abundant shelly organisms appear in the fossil record
  - B. Earth's interior was so hot that a solid outer crust, if present, was likely being extensively remelted
  - C. stable continental interiors, termed cratons, first formed
  - D. the dinosaurs first appeared and came to dominate large-scale terrestrial life
  
11. The principle difference between a slump and creep is \_\_\_\_\_.
  - A. the rate of motion
  - B. the grain size of the moving mass
  - C. the former mass contains abundant water whereas the latter is dry
  - D. the former mass contains pyroclastic debris from a volcanic eruption
  
12. Which organic substance is produced by black organic shales at temperatures below the oil window?
  - A. gold
  - B. coal
  - C. kerogen
  - D. keratin

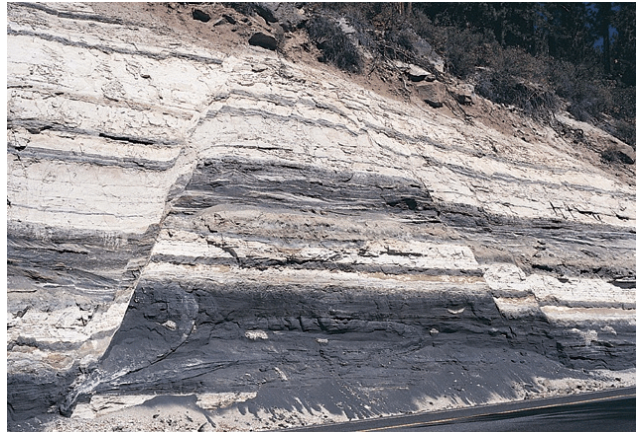
13. The first ores which were widely smelted by humans to produce metal were those of \_\_\_\_\_.  
A. bronze            B. copper            C. gold            D. iron
14. Commercial ore deposits are most likely to be found associated with \_\_\_\_\_.  
A. thick basinal sandstones and shales  
B. blueschists  
C. evaporite sequences  
D. igneous rocks
15. The Western Interior Seaway reached its greatest level of continental inundation during the \_\_\_\_\_ period.  
A. Ordovician            B. Carboniferous            C. Jurassic            D. Cretaceous
16. Which ore minerals are commonly found in ancient sedimentary deposits that are two billion years old?  
A. copper sulfides  
B. aluminum oxides  
C. iron oxides  
D. copper oxides
17. Saltation of sand involves \_\_\_\_\_.  
A. spherical grains rolling along the surface of dunes  
B. grains hopping into the air, traveling for a short distance, and returning to the ground  
C. grains being carried long distances (up to tens of kilometers) by strong gusts of wind  
D. the mixture of quartz sand with salt, which forms from the evaporation of rainwater
18. The Earth is approximately how old?  
A. 15 billion            B. 4.6 billion years            C. 40 million years            D. 6,000 years
19. The late Proterozoic Grenville orogen is an event related to \_\_\_\_\_.  
A. uplift of the modern Rocky Mountains  
B. uplift of the ancestral Rocky Mountains  
C. assembly of the supercontinent Pangaea  
D. assembly of the supercontinent Rodinia
20. The Mesozoic era is a time in Earth history when \_\_\_\_\_.  
A. the first abundant shelly organisms appear in the fossil record  
B. Earth's interior was so hot that a solid outer crust, if present, was likely being extensively remelted  
C. stable continental interiors, termed cratons, first formed  
D. the dinosaurs first appeared and came to dominate large-scale terrestrial life
21. A shield is \_\_\_\_\_.  
A. a low-lying region where Precambrian rocks form tall mountains  
B. a low-lying region where Precambrian rocks are covered by Phanerozoic sedimentary strata  
C. a region of compressed rock located behind a volcanic arc at a convergent continental margin  
D. different than a craton
22. The most expansive hot deserts on Earth occur \_\_\_\_\_.  
A. in the tropics, at or near the equator  
B. in the subtropics, between 20 and 30° north or south of the equator  
C. in the temperate zone, between 30 and 50° north or south of the equator  
D. at the poles
23. Which mineral resources are considered renewable?  
A. base metals only  
B. nonmetallic minerals only  
C. iron and aluminum ores  
D. no mineral resources are renewable.
24. A(n) \_\_\_\_\_ is a conical wedge of sand and gravel deposited by flash floods at the base of a slope.  
A. alluvial fan            B. ventifact            C. wadi            D. yardang

25. An iridium-rich layer of clay, glass spherules, and shocked quartz grains strongly suggest that the K-T boundary extinctions were at least in part caused by \_\_\_\_\_.  
A. a long trend of global warming  
B. a long trend of global cooling  
C. worldwide explosive volcanism  
D. the impact of a bolide (meteoroid or comet)
26. Which of the following factors decreases the risk of mass movement?  
A. nearby earthquakes  
B. excavation into the base of a hill  
C. adding weight to the top of a hill  
D. adding vegetation to the side of a hill
27. Caliche forms in desert climate through the dissolution and reprecipitation of \_\_\_\_\_ during and after rainstorms.  
A. manganese oxide                      B. quartz                      C. calcite                      D. iron oxide
28. Orogenesis (mountain building) leads to the production of \_\_\_\_\_.  
A. metamorphic rocks only  
B. igneous rocks only  
C. sedimentary rocks only  
D. all three major rock types
29. Towards the end of the Archean eon, \_\_\_\_\_.  
A. the first abundant shelly organisms appear in the fossil record.  
B. Earth's interior was so hot that a solid outer crust, if present, was likely being extensively remelted  
C. stable continental interiors, termed cratons, first formed  
D. the dinosaurs first appeared and came to dominate large-scale terrestrial life
30. Which fossil fuel, oil or natural gas, is found at greater depths within the Earth, and why?  
A. oil, because it is more stable at high temperatures  
B. oil, because it is more stable at low pressures  
C. gas, because it is more stable at high temperatures  
D. gas, because it is more stable at low pressures
31. The Cambrian period is a time in Earth history when \_\_\_\_\_.  
A. the first abundant shelly organisms appear in the fossil record  
B. Earth's interior was so hot that a solid outer crust, if present, was likely being extensively remelted  
C. stable continental interiors, termed cratons, first formed  
D. the dinosaurs first appeared and came to dominate large-scale terrestrial life
32. Secondary-enrichment deposits are most similar in mode of formation to which other deposit type?  
A. hydrothermal deposits  
B. placer deposits  
C. residual mineral deposits  
D. sedimentary deposits
33. Which of the following increases the risk of mass movement?  
A. adding a small amount of moisture to loose, dry sediment  
B. breaking waves before they reach sea cliffs  
C. flooding the sediment with water beyond saturation  
D. reducing the grade of the slope
34. The world's supply of oil is likely to be depleted in about \_\_\_\_\_ years.  
A. ten                      B. one hundred                      C. one thousand                      D. one million
35. The principle difference between a slump and a lahar is \_\_\_\_\_.  
A. the direction of the moving mass  
B. the grain size of the moving mass  
C. the former mass contains abundant water whereas the latter is dry  
D. a lahar is fluid; a slump is not

36. Which type of bedrock provides the greatest risk of landslide?  
A. granite      B. gneiss      C. sandstone      D. shale
37. The first widely used alloy in ancient civilizations was \_\_\_\_\_.  
A. bronze      B. copper      C. gold      D. iron
38. Most of the world's coal was deposited in coal swamps during the \_\_\_\_\_.  
A. Cretaceous      B. Ordovician      C. Carboniferous      D. Jurassic
39. A fold-and-thrust belt is \_\_\_\_\_.  
A. a low-lying region where Precambrian rocks crop out  
B. a low-lying region where Precambrian rocks are covered by Phanerozoic sedimentary strata  
C. a region of compressed rock located behind a volcanic arc at a convergent continental margin  
D. synonymous with "craton"
40. During heavy rainstorms, rates of physical weathering and erosion are \_\_\_\_\_.  
A. greater in humid climates than in deserts, because dry desert soils can soak up all of the available moisture  
B. greater in deserts than in humid climates, because vegetation tends to hold soil together  
C. greater in humid climates than in deserts, because vegetation tends to break up the soil  
D. about equally fast in deserts and in humid climates
41. The stereotypical gold rush prospector panning for gold in a stream bed is an example of exploiting \_\_\_\_\_.  
A. magmatic deposits  
B. placer deposits  
C. residual mineral deposits  
D. sedimentary deposits
42. Native Americans produced petroglyphs by etching into \_\_\_\_\_.  
A. rocks that had been subjected to case hardening  
B. rocks that had been coated with desert varnish  
C. dark basalts  
D. obsidian
43. The Taconic, Acadian, and Alleghenian orogenic events all led to uplift in the region of the modern \_\_\_\_\_.  
A. Rockies      B. Appalachians      C. Alps      D. Himalayas
44. Cenozoic convergence along western North America gave way to rifting which created the characteristic topography of the \_\_\_\_\_.  
A. Coastal Ranges      B. Basin and Range Province      C. Colorado Plateau      D. Columbia Plateau
45. Which of the following types of mass movement takes place most gradually?  
A. slump      B. creep      C. rock slide      D. mudflow
46. Most of the hydrocarbons within oil and natural gas are derived from the breakdown of organic matter from once-living \_\_\_\_\_.  
A. dinosaurs      B. planktonic algae      C. terrestrial plants      D. mammals
47. Why is radiocarbon dating only rarely applied in geological work?  
A. No substances on Earth contain significant amounts of carbon-14.  
B. The half-life of carbon-14 is so long that it is effectively a stable isotope.  
C. The half-life of carbon-14 is so short that it can only be used to date materials that are less than 70,000 years old.  
D. Carbon 14 is a myth
48. Mineral rich veins within plutons, deposited by hot groundwater into fractures within the rock characterize \_\_\_\_\_.  
A. hydrothermal deposits  
B. placer deposits  
C. residual mineral deposits  
D. sedimentary deposits

The next two questions refer to the picture to the right.

49. What kind of geologic structure is pictured?  
 A. An anticline  
 B. A syncline  
 C. Normal faulting  
 D. Reverse faulting
50. What is the name of the feature in the center of the photograph?  
 A. A graben  
 B. Slickensides  
 C. Basin and range  
 D. A horst



**True-False (10 points)**

51. Acid mine drainage is one environmental consequence of mining certain ores.	T	F
52. Orogenesis results in bending, breaking, smashing, shearing and partial melting of pre-existing rocks.	T	F
53. The first land plants are recorded in Miocene rocks.	T	F
54. Cratons are the stable interior portions of continental land masses.	T	F
55. The energy stored in coal and oil is indeed fossilized sunshine.	T	F
56. William Smith, by producing the first geologic map, opened the door to the industrial revolution.	T	F
57. Faults are fractures along which displacement has occurred; displacement does not occur along joints.	T	F
58. The principle of inclusions states that the material enclosing an inclusion is always older than the inclusion itself	T	F
59. Suspect terranes describes unusual and vexing railroad cars.	T	F
60. Creep is easily measured from deformed	T	F
61. An isotope is a kind of landform created in desert environments.	T	F
62. In a undisturbed sequence of sedimentary rocks, younger layers overly older layers, according to the principle of superman.	T	F
63. Loess consists mostly of silt-sized windblown sediment.	T	F
64. As compared to humid climates, rates of chemical weathering in deserts are more rapid.	T	F
65. Black smokers, hydrothermal vents on the seafloor, are found in subduction zones.	T	F
66. The Proterozoic Eon is represented by rocks containing abundant shelly fossils	T	F
67. <i>Tyrannosaurus Rex</i> , the heroine of Jurassic Park, was really a Cretaceous dinosaur.	T	F
68. Geologists use strike and dip measurements to characterize the spatial orientation of geologic structures.	T	F
69. James Hutton, the "father of modern geology," put forth the principle of uniformitarianism	T	F
70. Alluvial fans become increasingly fine-grained away from uplifted source areas.	T	F

**Matching (5 points)** Place the letter of the tectonic or geological event on the right next to the corresponding geologic time on the left

Geologic Time	Tectonic or Evolutionary Event
71. _____ Proterozoic	A. The "Age of Mammals"
72. _____ Archean	B. Pangaea Breaks up
73. _____ Tertiary	C. Warm limey sediments in present-day Indiana receive ash from Taconic volcanoes
74. _____ Triassic	D. Lush tropical swamps cover much of eastern North America
75. _____ Cretaceous	E. Fossil evidence becomes abundant
76. _____ Ordovician	F. Formation of Rodinia
77. _____ Devonian	G. The Laramide Orogeny deforms western North America
78. _____ Quaternary	H. The first forests grow on Acadian Mountain deltaic debris
79. _____ Carboniferous	I. Bald apes overrun the planet
80. _____ Cambrian	J. The first life

**Short answer (10 points)**

81. Describe how a rainshadow desert forms.

82. Draw a diagram that shows the relative motion and offset characteristics of a thrust fault.

83. Draw an angular unconformity (2). What is the geological significance of these features? (3)

84. **Essay question (10 pts) On this page, write a brief, cogent and lucid essay on ONE of the following topics.**

- A. Describe the events that transformed natural geological hazards into natural disasters at one of the following localities.
  - i. The Caraballeda Coast, Northern Venezuela
  - ii. The Viaont River Valley, Northern Italy
- B. Describe the sequence of events that is necessary for the generation and preservation of a large petroleum deposit.
- C. Describe the bolide hypothesis for the K-T Boundary Event. Include the evidence for a bolide,

85. **EXTRA CREDIT (up to 10 points)**

Provide a chronologic sequence that describes milestones in the evolution of life on planet Earth.