

Name _____

Geology 101
Fall 2008
Exam #3

1. Sketch and describe how tides relate to the position of the Moon and why.
2. What was the topic of the movie that we saw last class? Why did I say that it was encouraging and optimistic?
3. Describe evidence used to infer that glaciers once covered a landscape.

4. There's a graph in your book that shows that high water velocity is associated with coarse sediment transport, and low water velocity is associated with fine sediment transport. This is true. So, if rivers generally have higher velocities downstream than upstream, they should be able to move larger sedimentary grains. But, in general, coarse material is deposited way upstream - near a river's source - and finer material downstream, closer to the mouth. Why? Why this apparent contradiction?

5. What can cause base level to rise or fall, and what happens to a stream as a result?

6. Describe why sediment is deposited along mountain fronts in alluvial fans.

7. Describe the characteristics of meander scars and oxbow lakes that form on the floodplains of meandering rivers. Use a drawing to answer.

8. Why are good oil deposits rare? What things are necessary to create a super terrific oil field?

9. Summarize how coal forms. Describe the different types of coal, ranking them from lowest quality to highest quality.

10. For coal-bed methane, oil shale, and tar sand, summarize what the energy-producing substance is, how it forms, where it is most abundant, and how it is, or could be, extracted. Are these three usable sources of energy today? Why or why not?

Multiple Choice Questions

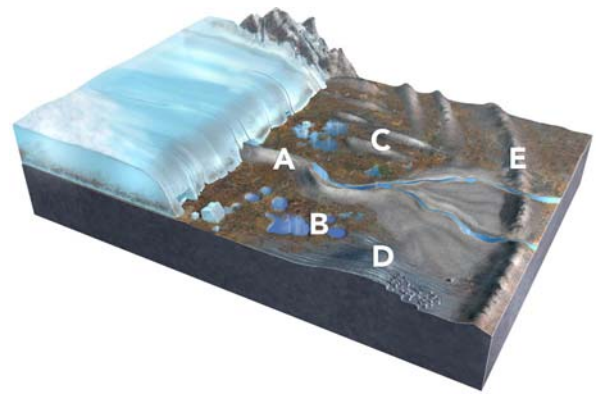
1. What is the origin of smooth troughs cutting across the landscape in the Great Lakes area?
 - a. the areas were covered by soft marine sediments
 - b. a huge flood coming from Iowa flowed toward the Great Lakes
 - c. glaciers carved the smooth troughs
 - d. all of the above
 - e. a and b only
2. What causes high and low tides?
 - a. the tendency for water on a spinning globe to be thrown outward
 - b. daily heating and cooling of the seas, which causes seawater to contract and expand
 - c. a rise in sea level during the day because of an increase in storms
 - d. water is pulled by the gravity of the Moon
 - e. all of the above
3. If waves approach the shore at an angle they:
 - a. die out before they reach the shore
 - b. begin to break in water depths deeper than the wave base
 - c. bend so they approach the shore more directly
 - d. do none of the above because waves do not approach the shore at an angle
4. Which of the following parts of a shoreline is more likely to experience intense erosion?
 - a. a straight part of the shoreline
 - b. a gently curved part of the shoreline
 - c. areas within a bay
 - d. the seaward end of a promontory
5. Sand and other sediment:
 - a. can move laterally along the coast if waves approach the beach at an angle
 - b. move up and down the slope of the beach
 - c. can slump downward if the sea bottom has too gentle a slope
 - d. are moved by the wind if the material is coarser than sand
 - e. both a and b
6. Which of the following shoreline features is generally composed of bedrock?
 - a. barrier island
 - b. offshore bar
 - c. spit
 - d. wave-cut platform
 - e. none of the above
7. In what direction does a spit typically grow with time?
 - a. toward a promontory
 - b. in the same direction as a longshore current
 - c. in the direction from which waves are approaching the coast
 - d. toward a wave-cut platform
 - e. none of the above
8. Which of the following most likely indicates that sea level has risen relative to the land?
 - a. offshore sand bars that have become coastal dunes
 - b. the presence of coral reefs on land
 - c. wave-cut notches and platforms that are above sea level
 - d. marine terraces
 - e. an irregular coastline with branching estuaries and embayments

9. Which of the following most likely indicates that sea level has fallen relative to the land?
- offshore sand bars that have become coastal dunes
 - the presence of coral reefs on land
 - wave-cut notches and platforms that are above sea level
 - marine terraces
 - all of the above
10. Which of the following would cause sea level to rise?
- a decrease in the amount of glaciers on land
 - faster rates of seafloor spreading
 - a rise in the temperature of the oceans
 - all of the above
 - a and b only
11. What is a primary reason an increase in glaciers on land would cause sea level to fall?
- because the temperature of the oceans decreases from cold glacial streams
 - an increase in snow cover causes the atmosphere to heat up which causes more evaporation
 - glaciers depress the land surface which pulls sea level down with it
 - glaciers tie up large volumes of water that would otherwise be in the sea
12. Which of the following is NOT a type of evidence left behind by glaciers?
- scratched and polished bedrock
 - scattered stones (dropstones) in fine-grained sediment
 - changes in the isotopic compositions of marine shells
 - V-shaped valleys
 - all of the above are evidence left behind by glaciers
13. What happens on either side of the equilibrium line in a glacier?
- sublimation occurs only above the line and melting occurs only below the line
 - melting occurs only above the line and sublimation occurs only below the line
 - above the equilibrium line, the amount of accumulation exceeds the amount lost by various processes
 - air temperatures are below freezing below the line and above freezing above the line
14. The margins of glaciers are usually darker than the interior primarily because:
- shearing causes the ice to expel air and become darker
 - glaciers are transparent so the underlying bedrock is visible
 - the sides are moving faster than the interior of the glacier
 - the sides have a higher concentration of rocks and other debris
 - all of the above
15. What name best describes the area of the lake in this photograph?
- terminal moraine
 - equilibrium line
 - hanging valley
 - lateral moraine
 - drumlin
16. How is a terminal or recessional moraine from a continental ice sheet typically expressed in the landscape?
- as teardrop-shaped hills
 - as a series of small depressions, many of which are lakes
 - as a series of jagged ridges in the mountains
 - as a series of gently curved ridges
 - as hills that are smooth on one side and rough on the other side



17. Which of the features labeled on this figure is an esker?

- A
- B
- C
- D
- E



18. Which of the features labeled on this figure (same as for previous question) is a terminal or recessional moraine?

- A
- B
- C
- D
- E

19. How are silt deposits called *loess* related to glaciers?

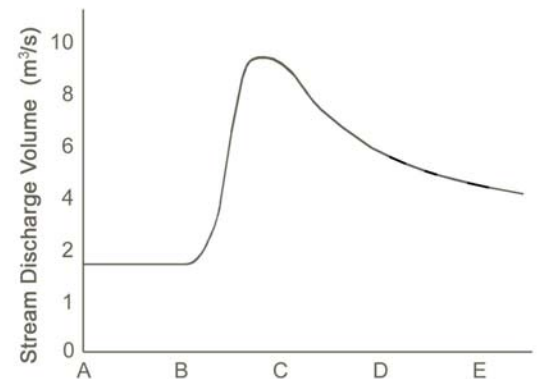
- a. they accumulate in lakes trapped behind glaciers
- b. they form in lakes as the lakes dried up at the end of the ice ages
- c. they were deposited by large glacially caused floods in the Pacific Northwest
- d. they are wind-blown accumulations and commonly are derived from glaciers

20. How could changes in Earth's tilt influence global climate?

- a. a high angle of tilt causes snow and ice to fall off the planet
- b. a minimum angle of tilt causes high latitudes to receive less sunlight during the summer, causing an increase in glaciers
- c. a maximum angle of tilt causes Earth to reflect more sunlight into space, causing an increase in glaciers
- d. a high angle of tilt causes the continents to move away from the poles leading to more glaciers

21. Which event is best represented by the hydrograph shown here?

- a. a summer thunderstorm
- b. a very long period of steady light rain
- c. a long drought with no rain for months
- d. a winter snowstorm followed by very cold weather



22. Which of the following does NOT influence whether sediment is picked up by a stream?

- a. size and density of the sediment
- b. turbulence of the moving water
- c. location of the sediment in the stream
- d. whether the river flows north-south or east-west

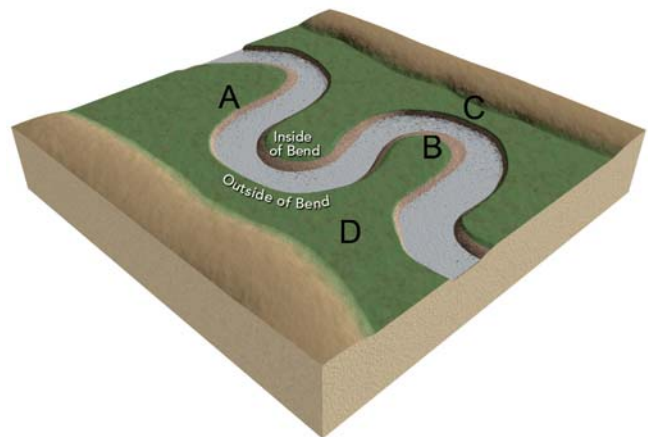
23. Which of the following sediment sizes is likely to be transported mostly on the bottom of the stream bed?

- a. fine sand
- b. sticky clay particles
- c. pebbles and cobbles
- d. dissolved materials

24. Which of the following is a condition favoring deposition of sediment?
- an increase in water velocity
 - a decrease in gradient of the stream
 - an increase in turbulence of the water
 - an increase in the salt content of the water
 - a decrease in grain size as a clast breaks into two pieces
25. The size of clasts that a river can carry is primarily controlled by:
- the water temperature
 - the dissolved and suspended load of a river
 - how close the river is to the ocean
 - the velocity and turbulence of the current
 - whether it is a permanent or ephemeral (temporary) stream
26. Which of the following typically decreases downstream in a river?
- flow velocity
 - discharge
 - channel size
 - load
 - none of the above
27. What does a profile of a river from its headwaters to its mouth typically show?
- an increase in gradient downstream
 - a straight-line profile reflecting a constant decrease in gradient
 - an abrupt increase followed by a gradual decrease
 - a curved shape that flattens out downstream
 - none of the above
28. Which of the following is true about the base level of a river?
- base level indicates the normal (or base) flow level before flooding
 - the flat top of a mountain is the ultimate base level for most rivers
 - a mountain is close to its base level if bedrock is close to the surface
 - most streams have lower gradient close to their base level
 - base level generally is near the steepest part of a stream's profile
29. Which of the following is unlikely to cause deposition of sediment along a river?
- a decrease in gradient
 - a decrease in water velocity
 - a drop in sea level
 - none of the above

30. At which site along this river would a point bar form?

- A
- B
- C
- D



31. If a stream-cut canyon is deep and narrow, which of the following is most likely to be true?
- rocks in the canyon walls are relatively soft and easy to erode
 - the stream is probably close to its base level
 - downcutting is occurring faster than widening
 - the stream contains mostly small clasts, such as silt

32. When water in a stream or desert wash decreases in velocity, sediment that the stream carries can be deposited in:
- a delta
 - an alluvial fan
 - a floodplain
 - all of the above
33. Which of the following is NOT associated with many braided rivers?
- an abundant supply of sediment
 - a broad sediment-covered plain
 - a range of sediment sizes, including sand and gravel
 - cutoff meanders

34. Which of the features on this aerial photograph is an oxbow lake?

- A
- B
- C
- D



35. Once oil and gas are formed, they:
- are lighter than water and so rise toward the surface
 - decompose quite quickly
 - flow most easily through impermeable rocks, such as shale
 - can be prevented from reaching the surface if they are trapped by permeable layers
 - both a and b
36. Oil that reaches the surface can form:
- an oil seep
 - tar sands
 - tar pits
 - all of the above
37. Which of the following must be present to form an oil field at depth?
- a salt dome
 - a fold or fault
 - a permeable rock to hold the oil
 - an impermeable unit above the oil
 - both c and d
38. How can a fault help trap oil?
- it can form an impermeable rock against which oil-bearing layers truncate
 - movement of layers over a bend in a fault can form an anticline
 - faulting can grind up and heat quartzite, producing oil
 - all of the above
 - a and b only

39. Which of the following parts of the U.S. do NOT have abundant oil fields?
- Texas
 - Gulf Coast area
 - Rocky Mountain area
 - Pacific Northwest
 - California
40. What is the starting material for coal?
- limestone with abundant shells
 - sandstone formed in certain environments
 - plants
 - black shale
 - any of the above
41. Some coal mines are called strip mines because:
- the carbon is stripped from the hydrogen during burning of the coal
 - the uranium is separated (stripped) from the coal
 - large underground machines strip away thin seams of coal
 - a mine on the surface mines a single long strip at any time
42. Where is coal being mined via the "mountain top removal" technique?
- North Dakota
 - In the Appalachians
 - South Africa
 - China and surrounding countries
43. Which of the following does NOT provide a significant amount of energy to the United States?
- coal
 - coal-bed methane
 - petroleum
 - oil shale
44. How is nuclear energy produced to generate electricity?
- lead is heated until it becomes molten and turns into uranium
 - hydrogen and helium are combined in the process of nuclear fusion
 - uranium decays into two smaller particles, releasing heat in the process
 - large panels collect light from the nuclear-powered Sun
45. What is true about naturally occurring uranium?
- most of it cannot be used to generate electricity
 - it is easily mined by pumping water out of the ground
 - it can be used to make nuclear weapons with little processing
 - it decays rapidly, so radioactive waste only has to be stored for short times
 - all of the above
46. Which of the following is NOT an advantage associated with hydroelectric dams?
- the amount of electricity can be changed rapidly
 - there are no emissions of greenhouse gases or toxic contaminants
 - the dam traps sediment that otherwise would be transported down the river
 - the main source of energy, gravity, is free
47. Which of the following is an advantage of wind power?
- it can be used nearly everywhere because all areas are windy enough
 - wind power is renewable and can be used in remote locations
 - even very weak winds produce significant amounts of electricity
 - wind turbines are attractive in scenic places, like off Cape Cod
 - it already provides a large percentage of the world's power requirements

48. Which of the following is true about a delta?
- a delta forms as channels merge and pile up sand
 - a river keeps forming a delta in the exact same position along a coastline
 - deltas form some layers that are horizontal and form some that are inclined toward the ocean
 - the total amount of sediment carried by the river increases from the start to the end of the delta system
49. What are some effects of building a dam?
- a river has more sediment below the dam and so can erode more efficiently
 - the reservoir (lake) traps sediment that over time fills up part of the reservoir
 - a dam, whether constructed by nature or by humans, represents a permanent change in base level
 - the river erodes into the land instead of depositing sediment, where it enters the reservoir
 - none of the above
50. Which of the following is the main reason that a delta forms when a stream flows into a lake or sea?
- the stream flows backward during high tide
 - ocean waves push the sediment up onto the beach
 - the velocity of the stream decreases
 - the stream began downcutting during the ice ages
 - none of the above
51. Which of the following can have a significant effect on a river?
- rises and drops in sea level
 - tectonics
 - types of bedrock in the river
 - changes in climate
 - all of the above
52. Which of the following sites is most likely to be flooded if all other factors are held constant?
- a site that is higher but closer to the river than a site that is lower but farther from the river
 - a site next to the river where the main channel is wider and deeper than other segments of the river
 - a site on the floodplain instead of a site on an older terrace
 - all of the above
53. Which of the following is true of a *100-year flood*.
- a 100-year flood occurs every 100 years on a given stream
 - the probability of a 100-year flood occurring on any given year is 1:100
 - a 100-year flood cannot occur twice within 10 years
 - the probability of a 100-year flood is related to how recently the last 100-year flood occurred
54. Which of the following contain significant (when compared to world demand) quantities of still-to-be-developed petroleum?
- the Bakken Formation of western North Dakota
 - the Arctic National Wildlife Refuge
 - off-shore continental shelves of the United States
 - the National Parks of the United States
 - none of the above
55. Ethanol
- is mostly made from corn in the United States
 - is not a significant source of energy anywhere in the world
 - could replace gasoline in the United States
 - is efficient to produce and use
 - all of the above.

56. What is true about world oil discoveries?
- a. they peaked in 1964 and has declined ever since
 - b. they peaked in 1971 and has declined ever since
 - c. they peaked in 1990 and has declined ever since
 - d. they peaked in 2002 and has declined ever since
 - e. they has generally increased, and is still increasing, since 1930

57. What kind of coal is found in North Dakota?
- a. peat
 - b. lignite
 - c. sub-bituminous
 - d. bituminous
 - e. anthracite

58. What is true about world demand for petroleum?
- a. it peaked in 1964 and has declined ever since
 - b. it peaked in 1971 and has declined ever since
 - c. it peaked in 1990 and has declined ever since
 - d. it peaked in 2002 and has declined ever since
 - e. it has generally increased, and is still increasing, since 1930

59. What is true about shale oil?
- a. it comes from fine grained sedimentary rock
 - b. there are many deposits world wide
 - c. it contains kerogen that can be converted to crude oil
 - d. it is an impractical and uneconomical source of energy today
 - e. all of the above

60. What is true about tar sand deposits?
- a. tar sand deposits are uncommon and found in only a few places
 - b. they contain lignite that can be converted to petroleum
 - c. they supply much of the petroleum used in the United States
 - d. they are mined using the mountain top removal technique
 - e. they are impractical and uneconomical sources of energy today