

Name \_\_\_\_\_

Name \_\_\_\_\_

Social Security # \_\_\_\_\_

**Geology 111G Survey of Geology  
Lecture Exam 4 FINAL**

**Multiple Choice (3 points each)****Circle the correct letter to complete the sentence.**

1. The study of the history and evolution of the earth is called:
  - a) geology
  - b) astrophysics
  - c) archeology
  - d) all of the above
  
2. The Mohorovicic Discontinuity (Moho):
  - a) is a seismic disconformity surface between the lithosphere and asthenosphere.
  - b) is a low velocity zone within the liquid core
  - c) is a high velocity zone within the liquid core
  - d) represents a seismic velocity shift present between the crust and the mantle.
  
3. Geophysicists have inferred the outer core of the earth is liquid because:
  - a) P-waves or compressional waves are not transmitted through the core.
  - b) Deep drill holes encounter magma at the core.
  - c) S-waves or shear waves are not transmitted through the core.
  - d) it is a zone of plastic deformation.
  
4. Earthquakes occur in what tectonic setting(s)?
  - a) convergent plate boundaries with subduction zones
  - b) divergent plate boundaries or rifts
  - c) strike-slip fault systems
  - d) all of the above settings
  
5. A magnitude 2 earthquake on the Richter scale is how many times larger than a magnitude 1:
  - a) 2
  - b) 20
  - c) 10
  - d) 100
  
6. Whether a metallic mineral deposit is considered an "ore" deposit or not may vary depending on the current state of:
  - a) the economy
  - b) technology
  - c) the political stability of the area
  - d) all of the above
  
7. Metallic minerals can be concentrated by which of the following processes:
  - a) gravity settling or mineral fractionation
  - b) hydrothermal fluids associated with an igneous pluton
  - c) chemical precipitation and intense weathering
  - d) all of the above
  
8. Copper ore deposits in Arizona and New Mexico are associated with dioritic plutons formed along an ancient:
  - a) subduction zone
  - b) groundwater table
  - c) earthquake

d) strike slip margin

9. The Witwatersrand gold deposit of South Africa is an example of an ore deposit formed by:

- a) hydrothermal fluids circulating around a cooling plutonic body forming a band of gold.
- b) crystal settling of gold minerals to the bottom of a magma chamber.
- c) concentration of heavy elements (gold) in a placer deposit (point bar conglomerate of a river system)
- d) contact metamorphism of coal at very high temperatures and pressures.

10. Which of the following describes the characteristics of a typical hydrocarbon reservoir rock:

- a) high porosity, but low permeability sandstone
- b) low porosity black shales
- c) thick, high porosity and permeability rocks
- d) a thin bed of very fine-grained, clay-rich sediments

11. Hydrocarbons migrate:

- a) upward, because they are less dense than the surrounding material.
- b) downward, due to gravity.
- c) downward, because they are less dense than the surrounding material.
- d) upward, due to evaporation.

12. The location of an earthquake in the interior of the earth is referred to as the:

- a) quakezone
- b) epicenter
- c) focus
- d) Bennefians zone

13. Heating hydrocarbons above 250 degrees centigrade results in:

- a) over-maturation and "baking" of the hydrocarbons
- b) purification or refinement of the oil
- c) distillation of the water dissolved in the oil
- d) none of the above

14. Which of the following can act as an effective aquiclude:

- a) a fault plane cemented tight by minerals
- b) a thick bed of porous and permeable sandstone
- c) highly fractured limestone beds
- d) all of the above

15. Coal is:

- a) a carbon-rich rock formed by chemical precipitation from seawater.
- b) a carbon-rich, metallic rock formed by low temperature alteration of organic-rich sediments.
- c) a carbon-rich rock formed by subjecting organic-rich sediments or peat to increased pressure and temperature.
- d) a carbon-rich, nonmetallic mineral formed as a placer deposit.

16. The "rank" of coal depends on the percentage of:

- a) oxygen present.
- b) sulfur present.
- c) carbon dioxide present.
- d) carbon present.

17. A "cone of depression" forms around groundwater wells when:

- a) igneous plutons are injected into the crust
- b) the rate of groundwater withdrawal is less than the rate of recharge.
- c) the rate of groundwater withdrawal is greater than the rate of recharge.
- d) the wells are contaminated by hydrothermal fluids.

18. Groundwater is defined as:

- a) surface runoff of water from rainstorms.
- b) water contained in saturated pore spaces within the bedrock, sediments, or soil regolith.
- c) water saturation of non-porous and non-permeable rocks
- d) any accumulation of water on the surface of the earth

19. Groundwater migrates or percolates:

- a) upward, because it is more dense than the surrounding material.
- b) downward, due to gravity
- c) downward, because it is more dense than the surrounding material
- d) upward, due to gravity

20. Water salinity varies depending on:

- a) the percentage of dissolved oxygen
- b) the percentage of dissolved solutes
- c) the percentage of dissolved calcium (Ca) ions
- d) the percentage of dissolved hydrocarbons

**Matching (2 points each)****Match the following groundwater related terms with their definition:**

- |                          |   |
|--------------------------|---|
| 21. _____ discharge area | a) non-porous and non-permeable rock horizon                          |
| 22. _____ recharge area  | b) where surface water soaks into pore spaces in the soil and bedrock |
| 23. _____ water table    | c) where the water table intersects the surface of the earth          |
| 24. _____ saturated zone | d) upper surface of the water saturated zone                          |
| 25. _____ aquifer        | e) soil or bedrock pore space is completely filled by water           |
| 26. _____ aquiclude      | f) large body of porous and permeable rock in the saturated zone.     |

**Matching (2 points each)****Match the hydrocarbon related terms with the correct description.**

- |  |   |
|--|---|
| 27. _____ structural traps accumulations | a) porous and permeable rocks containing hydrocarbon                  |
| 28. _____ stratigraphic traps            | b) hydrocarbon accumulations associated with reefs                    |
| 29. _____ reservoir rocks                | c) prevents migration of hydrocarbons.                                |
| 30. _____ hydrocarbon seal               | d) organic-rich sedimentary rocks deposited under reducing conditions |
| 31. _____ source rocks                   | e) hydrocarbon accumulations associated with anticlines or faults     |

**Fill in the blank (2 points each)**

Fill in the blank using the choice of words listed below:

faster	slower	basin	bedding
lithostratigraphy	pressure	Benioff	veins
ions	compound	ore	mineral
fertilizers	crystal form	Cenozoic	elevation
angular	lignite	disconformity	peat
subduction	cleavage	seal	black shale
bituminous	density	cataclastic	artesian
hydrolysis	active	contact aureole	source rock
carbonization	lateritic	lithosphere	faults
marine	sandstone	geology	solid

32. The inclined plane of earthquakes found associated with subduction zones is called a \_\_\_\_\_ zone.

33. A rock type that commonly serves as a source rock for hydrocarbons is \_\_\_\_\_

34. Aluminum ore can be mined from bauxite deposits created by intense leaching in \_\_\_\_\_ soils

35. Coal that has been subjected to moderately high temperatures and pressures and is formed of 80 to 90% carbon is called \_\_\_\_\_.

**Short Answer**

36. List four of the six conditions needed to form a hydrocarbon accumulation: (4pts; I'll give you 2 more points if you can list all 6!)

- 1)
- 2)
- 3)
- 4)

Extra credit:

- 5)
- 6)

37. What is the definition of a confined aquifer? (4pts)

38. What topic in geology do you find most interesting? (2pts)