

I. True/False Questions: circle a “T” for true or “F” for false (10% total -or- 0.5 per) (Correct answer in red)

1. (T F) Metamorphic facies represent regions in Temp.-Press. space.
2. (T F) A sandstone is an example of a biochemical sedimentary rock.
3. (T F) Limestone is a clastic sedimentary rock.
4. (T F) The grain size of a sandstone is larger than that of a shale.
5. (T F) Ice wedging is a form of physical weathering.
6. (T F) The reaction of feldspar to kaolinite is an example of hydration.
7. (T F) The A horizon of soil contains the highest proportion of organic material.
8. (T F) Oxidation is considered one of the physical weathering processes.
9. (T F) A slate is considered to be a “high-grade” metamorphic rock.
10. (T F) CO<sub>2</sub> is a greenhouse gas.
11. (T F) The solubility of limestone is increased as the acidity of water is increased.
12. (T F) An unconformity represents a period of erosion or non-deposition.
13. (T F) An alluvial depositional environment would be found on a continent.
14. (T F) Continental shelf depositional environments are considered to be marine environments.
15. (T F) Graded bedding is often found in turbidites.
16. (T F) Metamorphism always requires the presence of a fluid phase such as water.
17. (T F) Regional metamorphic rocks are produced along divergent plate boundaries.
18. (T F) Contact metamorphic aureole is produced by the intrusion of magma.
19. (T F) A quartzite is an example of a non-foliated metamorphic rock.
20. (T F) The Cenozoic Era is also known as the “Age of the Dinosaurs”.

II. Multiple Choice (80% total -or- 2 points per question)

1. An example of physical weathering would be:
  - a) Oxidation
  - b) Ice Wedging
  - c) Hydration
  - d) None of the above
  
2. The process of oxidation requires the following:
  - a) H<sub>2</sub>O
  - b) CO<sub>2</sub>
  - c) O<sub>2</sub>
  - d) None of the above
  
3. The soil horizon that contains weathered bedrock is termed:
  - a) A horizon
  - b) C horizon
  - c) B horizon

d) Z horizon

4. Spheroidal weathering requires the presence of:

- a) Water
- b) Temperate climate
- c) Joint fractures
- d) All of the above**

5. A laterite soil type would be expected to form in:

- a) Columbus, OH
- b) Seattle WA
- c) San Juan, Costa Rica**
- d) Chicago IL

6. In Mobile's humid-temperate climate one should expect the soil type to be:

- a) Pedalfer**
- b) Laterite
- c) Pedocal
- d) None of the above

7. A laterite soil is composed of primarily:

- a) Quartz
- b) Aluminum oxides**
- c) Olivine
- d) Humus

8. The definition of a clastic sedimentary rock would read as:

- a) Composed of fragments of pre-existing rocks.**
- b) Composed of carbonate material precipitated in sea water.
- c) Composed of carbonate material secreted by organisms.
- d) None of the above.

9. Of the following list which is not a clastic sedimentary rock:

- a) Sandstone
- b) Siltstone
- c) Limestone**
- d) Conglomerate

10. The term diagenesis refers to:

- a) A type of clastic sedimentary rock
- b) A type of metamorphism**

- c) A type of chemical weathering process
- d) The physical and chemical changes that buried sediments undergo

11. Which of the following clastic sediments indicates the greatest amount of transport:

- a) Arkose sandstone
- b) Breccia
- c) Conglomerate
- d) Quartz arenite sandstone

12. The order that chemical compounds precipitate from sea water is controlled by:

- a) Density
- b) Solubility
- c) Molecular weight
- d) Valence state

13. Of the following terms, which is considered to be a sedimentary structure:

- a) Graded bedding
- b) Ripple marks
- c) Cross bedding
- d) All of the above

14. Porosity in a sediment or sedimentary rock is a measure of:

- a) The percentage of water contained in the material
- b) The percentage of void space in the material
- c) The percentage of petroleum contained in the material
- d) The ability of water to be transmitted through the material

15. Which of the following sediments would become a conglomerate if lithified:

- a) Gravel
- b) Mud
- c) Sand
- d) Silt

16. Sand sized particles have diameters in the range:

- a)  $> 256$  mm
- b)  $< 0.0039$  mm
- c)  $2 - 0.062$  mm
- d) None of the above

17. The majority of sedimentary rocks are:

- a) Sandstone and conglomerate

- b) Siltstone, mudstone, and shale
- c) Limestone and dolostone
- d) Claystone

18. A sandstone that contains >25% feldspar is termed a:

- a) Quartz arenite
- b) Graywacke
- c) Arkose
- d) Lithic sandstone

19. Growth of coral reef organisms requires:

- a) Shallow marine water depths
- b) Tropical temperatures
- c) Clear water free of silt
- d) All of the above

20. An example of an organic sedimentary rock would be:

- a) Peat
- b) Coal
- c) Amber
- d) All of the above

21. Which of the following can be used to relatively date geological formations:

- a) Principle of inclusion
- b) Principle of superposition
- c) Principle of cross-cutting relationships
- d) All of the above

22. Of the following tectonic environments, which would be associated with blueschist facies metamorphic rocks?

- a) Volcanic arc
- b) Continental shelf
- c) Oceanic ridge
- d) Subduction zone (Convergent boundary)

23. Of the following environments, which would be directly above granulite facies rocks?

- a) Volcanic arc
- b) Continental shelf
- c) Continental shield
- d) Subduction zone

24. The main difference between low-grade and high-grade metamorphic rocks is:
- a) Pressure
  - b) Temperature**
  - c) Degree of deformation
  - d) Color
25. Directed pressure, which produces distortion in rocks, is due to:
- a) Tectonic forces**
  - b) Forces built up during burial
  - c) Increasing temperature
  - d) Increasing amounts of fluid
26. A gradual change in the chemical composition of a rock during metamorphism is termed:
- a) Porphyroblast development
  - b) Metasomatism**
  - c) Cataclastic development
  - d) Hydrothermal metamorphism
27. Valuable ore deposits are often associated with:
- a) Regional metamorphic rocks
  - b) Seafloor metamorphic (Hydrothermal) rocks**
  - c) Burial metamorphic rocks
  - d) Deformation metamorphic rocks (mylonites)
28. The tendency of a fine-grained metamorphic rock to split along planar fractures is termed:
- a) Foliation
  - b) Cleavage**
  - c) Metasomatism
  - d) Cataclastic
29. A high-grade foliated metamorphic rock would be a:
- a) Quartzite
  - b) Marble
  - c) Gneiss**
  - d) Amphibolite

30. A high-grade foliated metamorphic rock composed of alternating light and dark colored bands is termed a:

- a) Schist
- b) Gneiss**
- c) Phyllite
- d) Slate

31. A limestone subjected to regional metamorphism would become a:

- a) Schist
- b) Marble**
- c) Slate
- d) Gneiss

32. Of the following minerals, which is associated with regional metamorphic rocks:

- a) Garnet
- b) Staurolite
- c) Kyanite
- d) All of the above**

33. If a basalt were metamorphosed to a low grade it would be termed a:

- a) Amphibolite
- b) Greenstone**
- c) Granulite
- d) Eclogite

34. A sandstone metamorphosed to a high grade would be termed a:

- a) Amphibolite
- b) Marble
- c) Quartzite**
- d) Argillite

35. In metamorphic rocks a crystal that grows to a much larger size than the rock matrix is termed:

- a) Porphyroblast**
- b) Aphanitic
- c) Phenocryst
- d) Porphyritic

36. The lowest geothermal gradients produce:

- a) Greenschist facies
- b) Amphibolite facies
- c) Hornfels facies
- d) Blue schist/Eclogite facies

37. If a high grade metamorphic rock begins to partially melt the residue left behind will become a:

- a) Eclogite
- b) Blue Schist
- c) Granulite
- d) Marble

38. The principle of inclusion states that:

- a) Undeformed layered strata contain the older beds uppermost in the sequence
- b) Inclusions must pre-date the surrounding rock.
- c) Sediments are deposited as essentially horizontal layers
- d) Undeformed layered strata contain the younger beds uppermost in the sequence

39. In the film on the Mississippi River the Old River Containment Structure was constructed to keep the main flow of the Mississippi from diverting to the:

- a) Red River
- b) Mobile River
- c) Atchafalaya River
- d) Non of the above

40. Paleontology is the study of:

- a) Ancient plants preserved in rocks
- b) Ancient minerals
- c) Ancient life forms preserved in rocks
- d) Ancient Meteorite impact events

## Discussion Questions (10%)

I. (5%) List and describe the various principles used to relatively date rocks.

### I. Relative Dating

- a) Principle of Superposition: in an undeformed sequence of sedimentary rocks the layer uppermost in the section are youngest.
- b) Cross-cutting Relationships: A rock such as an igneous dike that cross-cuts another rock layer must be younger than the unit that is cut across.
- c) Inclusion: an inclusion must be older than the surrounding rock
- d) Faunal Succession: As organisms have evolved over time evidence of their existence (fossils) has been recorded in layers of sedimentary rock such that old rock layers contain primitive fossils and young strata contain fossils of more advanced organisms.



II. (5%) List the Geologic Time scale below: Include the Eons, Eras, and Periods and include the dates that separate the Eons and Eras.

Eons	Era	Periods
Phanerozoic	Cenozoic	Quaternary
540 Ma	65 Ma	Tertiary
Proterozoic	Mesozoic	Cretaceous
2.5 Ga	250 Ma	Jurassic
Archean	Paleozoic	Triassic
4.0 Ga	540 Ma	Permian
Hadean		Pennsylvanian
4.6 Ga		Mississippian
		Devonian
		Silurian
		Ordovician
		Cambrian