

GEOL 1122 Mid-Term Exam I
 11:00-12:15 Tuesday, September 11, 2018
 23 Questions 4 pages 100 points *Read all questions carefully!*

An asterisk ("*") indicates a question where leaving the answer space completely blank will result in deduction of $n-1$ points, where n is the number in brackets and is the question's point value.

Check one:

I am content to have my graded exam placed in a lettered box to which other students will have access.

I will wait in a line, in alphabetical order by last name, to have my graded exam handed to me after other student's exams are placed in lettered boxes.

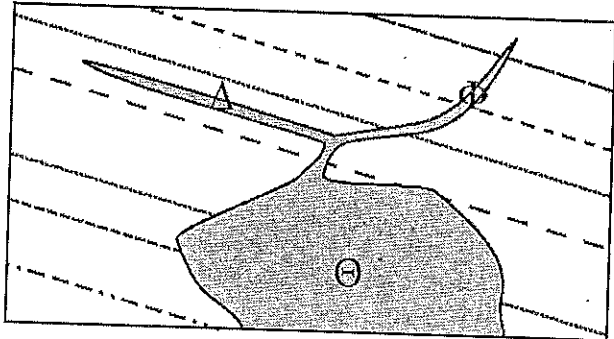
Name _____

Fold front page forward so name does not show.

1. Match the minerals with the appropriate characterization. [4]
- | | |
|---------------|-----------------------------------------------------------------------------------------------------|
| ___ Pyrite | A. $Mg_2CaSi_2O_6$, a common feldspar |
| ___ Anhydrite | B. FeS_2 , also known as "fools gold" and a mineral that will not form in the presence of O_2 . |
| ___ Calcite | C. $CaSO_4$, a common evaporite mineral |
| | D. $NaCl$, a common evaporite mineral. |
| | E. $CaCO_3$, a common carbonate mineral of which organisms make their shells. |
| | F. A common iron oxide (Fe_2O_3) that often looks rusty or red |

2. Match the minerals with the appropriate characterization. [3]
- | | |
|--------------|----------------------------------------------------------------------|
| ___ Quartz | A. Mineral that forms in the presence of O_2 . |
| ___ Hematite | B. Mineral at the sialic or felsic end of the sialic-mafic spectrum. |
| | C. Mineral that forms only during meteorite impacts |
| | D. Mineral found only rocks of Hadean age. |

3. The sketch at right shows three bodies of igneous rock, or three distinct parts one body of igneous rock. Give the name for each kind of intrusive body.



- | | | |
|---------------|--------------|--------------|
| ___ \ominus | A. Anticline | H. Haxon |
| ___ Φ | B. Basalt | L. Lorus |
| ___ Δ | D. Dike | M. Mesa |
| | E. Entron | P. Pluton |
| | F. Fault | S. Sill |
| | G. Gabbro | T. Triassold |

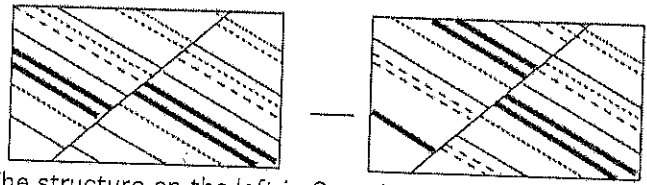
4. The three fundamental kinds of rocks recognized by geologists are ... (check three) [3]

- ___ Metamorphic ___ Phyllic ___ Mineralic ___ Cratonary ___ Palliative ___ Petrolic
- ___ Transitive ___ Magnesiatric ___ Sedimentary ___ Colligative ___ Igneous ___ Oxic

5. From the names shown in Question 4, write one correct name in each blank below. [3]

- _____ Rocks that originate only at Earth's surface
- _____ Rocks of two types, one that forms deep in the Earth and one that forms at Earth's surface.
- _____ Rocks that originate only deep in the Earth

6a. Match the structures in these cross-sections with their names. [4]



- | | |
|-------------------|--------------------|
| A. Anticline | O. Orocline |
| D. Declinic Fault | P. Pycnocline |
| L. Line Fault | R. Reverse Fault |
| M. Monocline | S. Syncline |
| N. Normal Fault | X. Xerocline Fault |

6b. The structure on the left in Question 6a would be the result of what kind of stress? [2]

- ___ A. Accellerative C. Compressive D. Dilative E. Extensional L. Lateral Shear T. Transitive

7. Match the kinds of plate tectonic boundaries with the processes at them. [5]

- | | | |
|---------------------------------------------------------------------------------------------|------------------------|-------------------------|
| ___ Generation of new lithosphere | A. Asymmetric Boundary | M. Mohorovicic Boundary |
| ___ Slippage of plates past each other horizontally with neither generation nor destruction | B. Bimodal Boundary | Q. Quiescent Boundary |
| ___ Destruction of old lithosphere | C. Convergent Boundary | S. Symmetric Boundary |
| | D. Divergent Boundary | T. Transform Boundary |
| | E. External Boundary | U. Uniform Boundary |
| | J. Jankowics Boundary | W. Wilson Boundary |

8. Define "granite" by checking one appropriate word in each of the three horizontal rows [3]

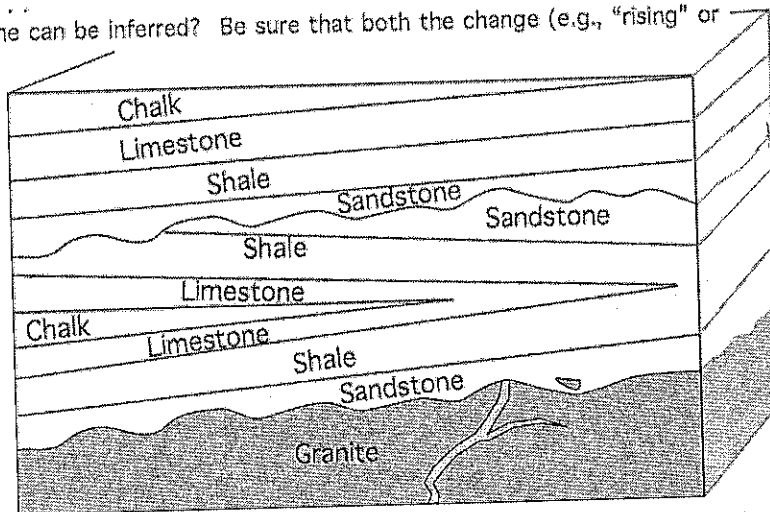
- ___ Extrusive ___ Obtrusive ___ Conductive ___ Intrusive
- ___ Sialic ___ Calcic ___ Hematic ___ Mafic ___ Phosphatic ___ Sulfuric
- ___ Fossil ___ Rock ___ Plate ___ Atom ___ Planet ___ Mineral ___ Fault

9. Most evaporites are deposited in or on (check all that required to complete the statement) [4]

- | | | |
|----------------------------------|------------------------------|----------------------|
| ___ Temperate Latitudes (35-55°) | ___ Restricted/marginal seas | ___ Mountaintops |
| ___ The Horse Latitudes (15-35°) | ___ Swamps and bogs | ___ Grassy meadows |
| ___ Polar Latitudes (>70°) | ___ The open ocean | ___ Deep oceans |
| ___ Equatorial Latitudes (<15°) | ___ River floodplains | ___ Gravelly beaches |

10. Regarding the block diagram at right . . .

a. What change(s) in sea level through time can be inferred? Be sure that both the change (e.g., "rising" or "falling") and time (e.g., "first" or "then" or "continuously") are clear. [3]



b. Carefully draw a solid line or lines indicating the surface that we can be most sure represents one moment in time. [2]

11. For the three categories of organisms below, put a "G" next to the one whose individuals have the greatest likelihood of preservation in the fossil record and an "L" next to the one whose individuals have the least likelihood of preservation in the fossil record. The intermediate case should be left blank. [4]

- ___ Terrestrial vertebrates (e.g., rodents, dinosaurs, humans, etc.)
- ___ Land plants and terrestrial insects
- ___ Marine shelly organisms (e.g., clams, snails, corals, echinoderms, etc.)

12. Our discussion of minerals concluded that (check one) [3]
- A. The (i) melting of silic minerals at lower temperatures than mafic minerals to produce silic magmas that rise through the earth and (ii) buoyancy (lesser density) of silic rocks than mafic rocks combine to give the elevated continents on which we live.
 - B. The continents on which we live exist because they are made of non-silicate minerals that are buoyant (less dense) compared to silicate minerals.
 - C. The continents on which we live exist because they are made of mafic minerals that are buoyant (less dense) compared to the non-silicate minerals of which the oceanic crust consists.
 - D. The abundance of halite in the oceanic crust explains why the latter is sufficiently dense to make the deep sea floor surrounding the continents.
 - E. The Hopi creator Taiowa directed that the continents be made of sulfate minerals, and so they are.

13. Which of the following were lines of geologic (rather than radiometric) evidence that we discussed as evidence that Earth is not young (i.e., a few thousand years old) but instead is at least many millions of years old. Check all that are correct. [4]

- Angular unconformities.
- Plutons exposed by erosion.
- Metamorphic rocks exposed by erosion.
- The thickness of the sequences of sedimentary rocks exposed on the continents.
- The time required for rivers to have given Earth's seawater its present salt content.

14. The philosophical (and scientific) idea known as "Ockham's Razor" is [4]

- A. The simplest explanation is the best explanation.
- B. The newest explanation is the best explanation.
- C. An explanation should not include ideas for which there is no evidence.
- D. The oldest explanation is the best explanation.
- E. The explanation proposed by the most authoritative expert is the best explanation.

15. Someone wants to determine the absolute age of a body of igneous rock that is overlain by an unconformity above which are sedimentary rocks of Cretaceous age. What method of radiometric dating do you recommend? [3]

- A. ^{14}C (radiocarbon)
- B. ^{238}U - ^{206}Pb
- C. ^{54}Fe - ^{51}V
- D. A and B
- E. B and C
- F. A, B, and C
- G. None of the above

15A. In what geologic period do we live? [3]

16. Measurement of the ^{40}K and ^{40}Ar in a particular crystal determines that there are 700 ^{40}Ar atoms and 100 ^{40}K atoms. The half-life of ^{40}K is 1.25 billion years. How old is the sample? Your answer should be some number of years. [4]

17. What are the features to which red arrows point in the images projected on the screen? One well-chosen word will suffice. [3]

18. The following questions apply to the cross-section at right.
 What is the oldest body of rock on the diagram? [2]

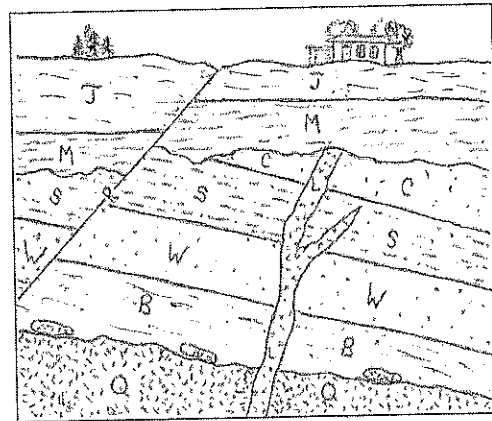
What is the youngest body of rock on the diagram? [2]

Of Features L and R, which is younger? [2]

If Layer C is Devonian and Layer W is Ordovician, the most likely age for Layer S is

C. Cretaceous	N. Neogene	S. Silurian
J. Jurassic	P. Permian	T. Triassic

[2]



19. What four lines of evidence using radiometric dating have led to the modern scientific conclusion about the age of the earth? Be sure to include the age yielded by each material or approach. [8]*

- _____ A. Radiocarbon dating of Earth's oldest rocks
- _____ B. U-Pb dating of the Earth using Earth's bulk lead and $^{207}\text{Pb}/^{204}\text{Pb}$ and $^{206}\text{Pb}/^{204}\text{Pb}$ ratios.
- _____ C. Radiometric dating of meteorites.
- _____ D. Calculation of the times of the four creations in the Hopi story of Earth's origin.
- _____ E. Radiocarbon dating of Earth's oldest fossils.
- _____ F. Radiometric dating of rocks from the Moon.
- _____ G. Radiocarbon dating of ancient gold deposits.
- _____ H. Radiometric dating of Earth's oldest rocks and oldest sand grains in sandstones.
- _____ J. Radiocarbon dating of seawater.

20. What, according to present scientific understanding, is the age of the Earth? [4]

21a. List the eons (the largest divisions) of geologic time from first to last, using words and arrows to make clear which was first (earliest) and which was last (most recent). [5]*

21b. How many years ago did the present eon begin? [2]

22. List the periods of the Mesozoic in order from first/earliest/longest-ago to last/latest/most-recent, using words and arrows to make clear which was first and which was last, and indicate *how many years ago* the Mesozoic began and ended. [5]*

23. Warren is a town in Ohio. It is clearly not in Mississippi, although some residents of the town may be from Mississippi. What does it mean to say that the bedrock on which Warren sits is "Mississippian"? [4]*