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### Geology 201 Final Exam, Fall 1999

Exam rules apply.  
Time allowed: Two hours

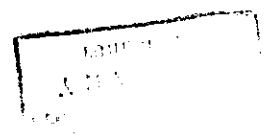
#### Section A: (60 marks)

Answer the questions on the sheet provided. Note that two marks will be given for each correct answer and half a mark will be deducted for each incorrect answer.

- The mineral Dolomite is an example of a:
  - Sulphate.
  - Phosphate.
  - Carbonate.
  - Double chain silicate.
  - Sheet silicate.
- Which of the following statements regarding a silicate mineral that has the basic formula  $(Si_4O_{10})$  is true?
  - Each silicate tetrahedron shares one oxygen atom.
  - Each silicate tetrahedron shares two oxygen atoms
  - Each silicate tetrahedron shares three oxygen atoms
  - Each silicate tetrahedron shares four oxygen atoms.
  - None of the above.

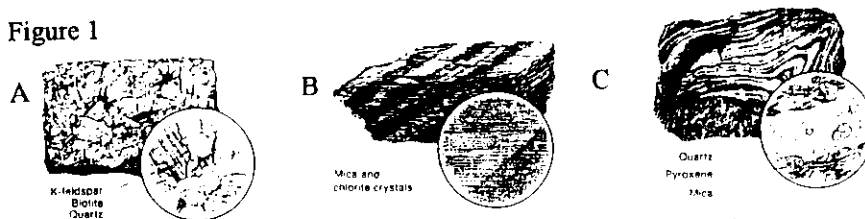
Table 1

Quartz	7	$SiO_2$
Calcite	4	$CaCO_3$
Apatite	5	$Ca_5(PO_4)_3(F,OH)$
Orthoclase	6	$NaAlSi_3O_8$
Gypsum	2	$CaSO_4 \cdot 2H_2O$
Talc	1	$Mg_3Si_4O_{10}(OH)_2$

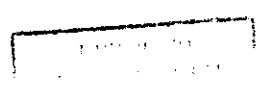


- By the process of elimination determine which of the following statements regarding Table 1 is correct?
  - Two of the minerals have been assigned a hardness value (second column) that is incorrect
  - Only two of the minerals have been assigned their correct chemical composition
  - All of the minerals have been given the correct chemical composition
  - Statements A and B are both correct
  - None of the above statements are correct

Figure 1



- The rocks A, B and C shown in figure 1 would be best described as:
  - Granite, Slate and Gneiss
  - Sandstone, Pumice and Schist
  - Granite, Shale and Phyllite
  - Rhyolite, Shale and Schist
  - Pumice, Phyllite and Coal



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5. Aa is best described as:

- a. An ash flow
- b. A low viscosity lava flow with a ropey texture
- c. A pyroclastic flow with a blocky texture
- d. All of the above
- e. None of the above

Table 2

1	Rhyolite	A	Orthoclase, Quartz, Mica +/- Amphibole
2	Dacite	B	Plagioclase, Quartz, Mica +/- Amphibole
3	Andesite	C	Plagioclase, Mica & Olivine
4	Basalt	D	Plagioclase, Mica, Amphibole
		E	Orthoclase, Quartz +/- Olivine
		F	Plagioclase, Pyroxene & Olivine

6. Table 2 shows four rock types 1-4 and six mineral assemblages A-F. If you were to match the rock type to the correct mineral assemblage then the answer would be?

- a. 1→F, 2→E, 3→B and 4→A
- b. 1→A, 2→C, 3→B and 4→E
- c. 1→B, 2→A, 3→C and 4→E
- d. 1→A, 2→B, 3→D and 4→F
- e. 1→B, 2→A, 3→D and 4→F

Table 3

(1) Hematite	(A) Hematite
(2) Feldspar	(B) Limonite
(3) Gypsum	(C) Kaolinite
(4) Pyroxene	(D) Anhydrite

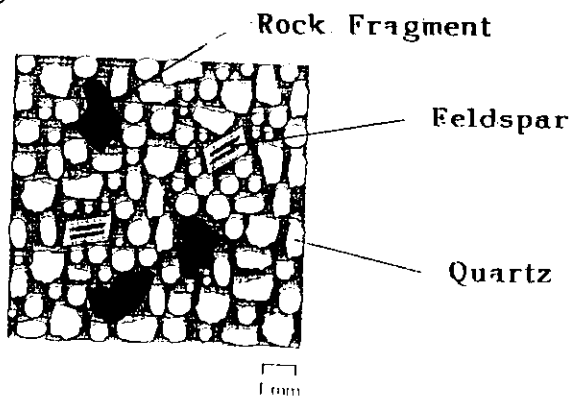
7. The minerals in the first column of Table 3 (labelled 1-4) alter to which of the minerals (labelled A-D) in the second column during chemical weathering?

- a. 1→D, 2→C, 3→B, 4→A
- b. 1→C, 2→A, 3→B, 4→D
- c. 1→A, 2→C, 3→D, 4→B
- d. 1→B, 2→C, 3→D, 4→A
- e. 1→A, 2→B, 3→D, 4→C

8. The type of soil developed in a warm dry climate is known as a:

- a. Laterite
- b. Pedocal
- c. Pedalfer
- d. Regolith
- e. Aridosoil

Figure 2:

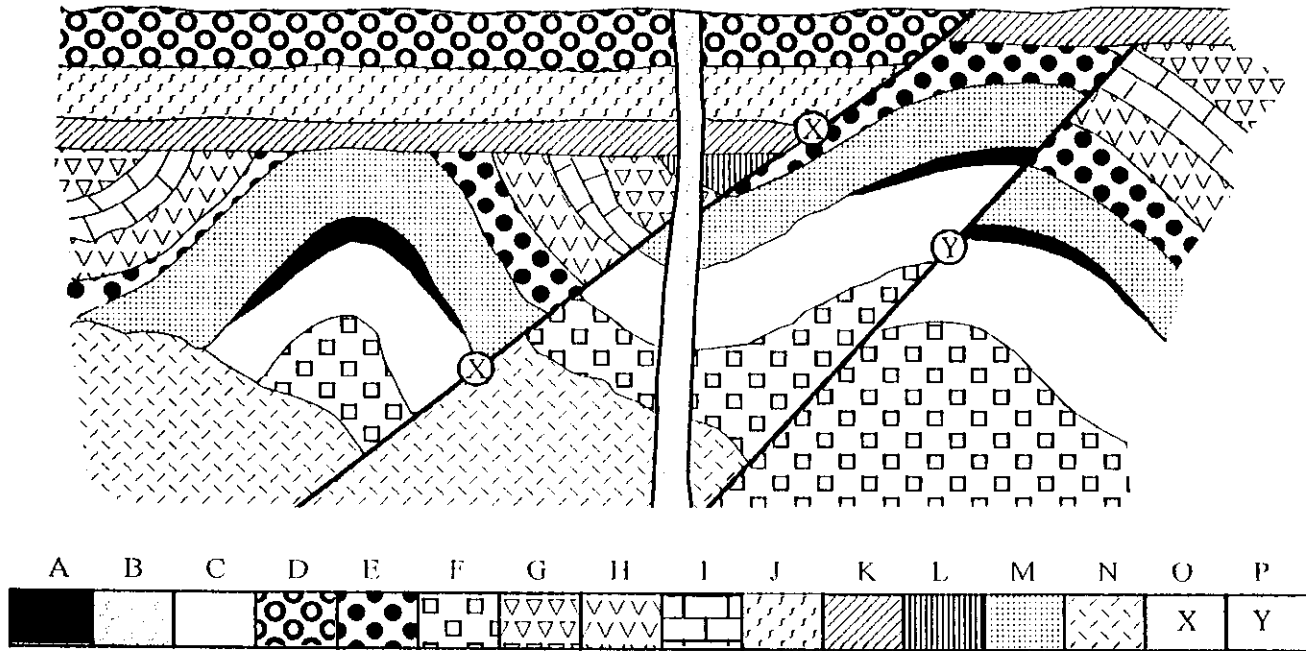


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9. The clastic rock shown in figure 2 would be best described as a:
  - a. Monomict ortho-pebble-breccia
  - b. Siltstone
  - c. Arkose
  - d. Quartz arenite
  - e. Greywacke
  
10. Which of the following sediments is not a biochemical sediment
  - a. Oil shale
  - b. Calcareous ooze
  - c. Gypsum
  - d. Biomicrite
  - e. Fossiliferous limestone
  
11. A single angular clast of limestone (size 84mm) is known as a:
  - a. Boulder gravel
  - b. Cobble
  - c. Pebble breccia
  - d. Boulder conglomerate
  - e. Sand
  
12. Which type of coal contains the highest percentage of carbon?
  - a. Peat
  - b. Anthracite
  - c. Lignite
  - d. Bituminous
  - e. Subbituminous
  
13. Metamorphism in a subduction zone is associated with:
  - a. High temperatures and high pressures
  - b. High temperatures and low pressures
  - c. Low temperature and low pressures
  - d. Low temperature and high pressures
  - e. None of the above
  
14. Which of the following metamorphic rocks belongs to the greenschist facies?
  - a. Granulite
  - b. Gneiss
  - c. Schist
  - d. Slate
  - e. Eclogite
  
15. Which of the following minerals is not used as an index mineral when determining metamorphic zones?
  - a. Chlorite
  - b. Staurolite
  - c. Garnet
  - d. Muscovite
  - e. Sillimanite
  
16. What is the name given to a large crystal in a metamorphic rock?
  - a. Phenocryst
  - b. Porphyry
  - c. Porphyroblast
  - d. Pegmatite
  - e. Pyroxene

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Figure 3 is a cross-section through a part of the Earth's crust. Note that units A, B G and N are all intrusive igneous rocks and X and Y are faults. Examine the cross-section carefully before answering questions 17 and 20.



17. The boundary at the bottom of layer K would be best described as:

- A disconformity
- A nonconformity
- An angular unconformity
- A fault
- None of the above

18. The line marked Y in figure 3 is:

- A normal fault
- A reverse fault
- A dextral strike-slip fault
- A sinistral strike-slip fault
- None of the above

19. Unit A forms an intrusion which would be best described as a

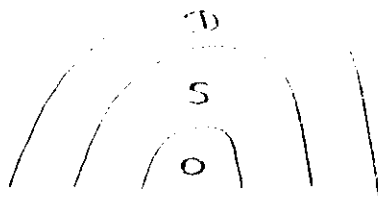
- Sill
- Laccolith
- Lopolith
- Phacolith
- Cone sheet

20. If the rock units and structures were to be written in order from oldest to youngest then the order would be:

- F, C, M, E, H, I, G, A, N, L, P, K, J, D, O, B
- N, F, C, M, E, H, I, G, A, P, L, K, J, D, O, B
- B, O, P, N, A, C, D, G, H, E, J, K, I, M, F, L
- F, C, A, M, E, H, I, G, N, L, P, K, J, D, O, B
- N, F, C, A, M, E, H, I, G, L, P, K, J, D, O, B

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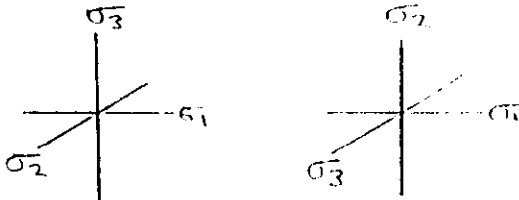
Figure 4.



D = Devonian  
S = Silurian  
O = Ordovician

21. The fold shown above is best described as:
- Neutral syncline
  - Antiformal anticline
  - Antiformal syncline
  - Synformal syncline
  - Synformal anticline
22.  $K^{40}$  has a half-life of 1.3 billion years. If there were initially 1000 atoms of  $K^{40}$  how many atoms of  $Ar^{40}$  would there be after 3.9 billion years?
- 500
  - 875
  - 105
  - 770
  - None of the above
23. If the stresses acting on a cube are as follows  $\sigma_1=10$ ,  $\sigma_2=7$  and  $\sigma_3=4$  then the result would be?
- The cube would become shorter in the  $\sigma_1$  and  $\sigma_2$  directions and longer in the  $\sigma_3$  direction.
  - The cube would become shorter in the  $\sigma_1$  and  $\sigma_3$  directions and longer in the  $\sigma_2$  direction
  - The cube would become shorter in the  $\sigma_1$  and longer in the  $\sigma_2$  and  $\sigma_3$  directions
  - The cube would become shorter in the  $\sigma_1$  and longer in the  $\sigma_3$  direction. The length of the cube in the  $\sigma_2$  direction would stay the same.
  - The cube would become shorter in all directions

Figure 5:



24. Which types of fault would be associated with the stress regimes shown in figures 5a and 5b?
- A = normal, B = reverse
  - A = normal, B = strike-slip
  - A = strike-slip, B = reverse
  - A = reverse, B = normal
  - A = reverse, B = strike-slip
25. The Gutenberg discontinuity is found between:
- The upper and lower continental crust
  - The crust and the mantle
  - The lithosphere and the asthenosphere
  - The mesosphere and the outer core
  - The inner core and the outer core

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26. The geographic point on the Earth's surface directly above the point at which slip initiates is known as the:
- Focus
  - Rebound point
  - Slip point
  - Epicentre
  - Seismocentre
27. The natural floatational balance of lithospheric plates on the asthenosphere is known as:
- Stopping
  - Isostasy
  - Buoyancy
  - Sag
  - Viscosity
28. Which of the following statements is true with respect to divergent plate margins?
- They are associated with shallow earthquakes
  - The prominent type of metamorphism is high pressure, low temperature
  - The characteristic igneous rocks are basaltic
  - All of the above are correct
  - Only a and c are correct
29. What was the name of the supercontinent that existed in the late Proterozoic
- Laurasia
  - Gondwanaland
  - Pangaea
  - Rodinia
  - Panthalassa
30. At which of the following plate boundaries would you expect to see an accretionary prism?
- Ocean-ocean divergent
  - Ocean-ocean convergent
  - Continental-continental transform
  - Ocean-ocean transform
  - Continent-continent divergent

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Answer the questions for section A in the table below. Remember that **two marks** will be given for each correct answer and **half a mark** will be deducted for each incorrect answer.

1	a	b	c	d	e
2	a	b	c	d	e
3	a	b	c	d	e
4	a	b	c	d	e
5	a	b	c	d	e
6	a	b	c	d	e
7	a	b	c	d	e
8	a	b	c	d	e
9	a	b	c	d	e
10	a	b	c	d	e
11	a	b	c	d	e
12	a	b	c	d	e
13	a	b	c	d	e
14	a	b	c	d	e
15	a	b	c	d	e
16	a	b	c	d	e
17	a	b	c	d	e
18	a	b	c	d	e
19	a	b	c	d	e
20	a	b	c	d	e
16	a	b	c	d	e
17	a	b	c	d	e
18	a	b	c	d	e
19	a	b	c	d	e
20	a	b	c	d	e
26	a	b	c	d	e
27	a	b	c	d	e
28	a	b	c	d	e
29	a	b	c	d	e
30	a	b	c	d	e

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**Section B (20 marks)**

**Name:**

Using **labelled diagrams** and examples explain what is meant by the following: **(Remember no diagram = no grade)**

1. Metamorphic aureole

2. Rhythmic bedding

3. Deep-sea oozes

4. Unconformity

5. Radiometric dating



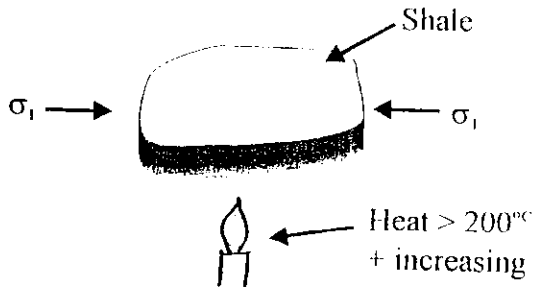
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Section C (20 marks)

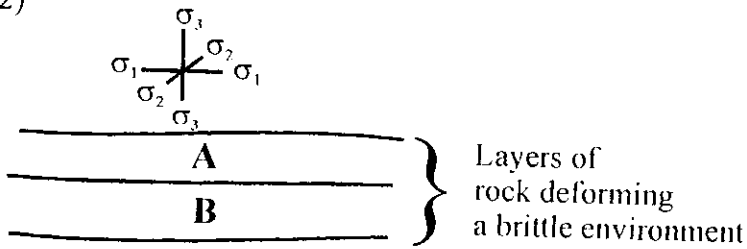
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Using labelled diagrams show the possible results of the action depicted in the figure.  
**(Remember no diagram = no grade)**

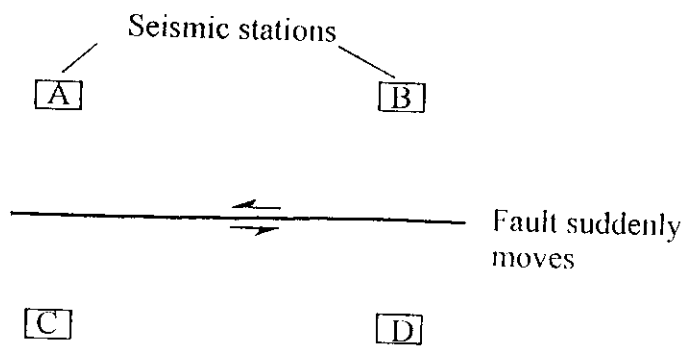
1)



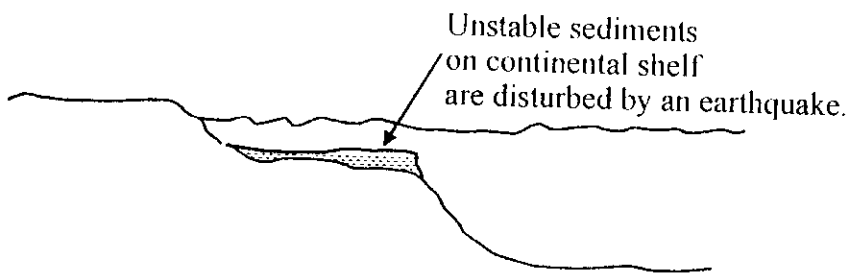
2)



3)



4)



5)

