

Name:
Student Number:

EXAM TA1910-AES1910-AES 1750
General Geology – Geology for Engineers -
January 26, 2010

Although the exam is written in English, you are free to answer in Dutch or English. The terminology you use can be in Dutch or English. Please keep the answers short and to the point. You can use sketches for illustrations. There are 8 open questions (70% of the grade) and 10 multiple-choice questions (30% of the grade). The numbers between brackets are indicative for the maximum score. Good luck!

NB: some of you who followed this course in previous years only have to do the first or second part of this exam. Open questions 1 to 4 and multiple-choice questions 1 to 5 correspond to part 1; open questions 5 to 8 and multiple-choice questions 6 to 10 correspond to part 2. Clearly indicate “Part 1 only” or “Part 2 only” on your answers sheets if this applies to you.

Open Questions:

1. Geologic Systems

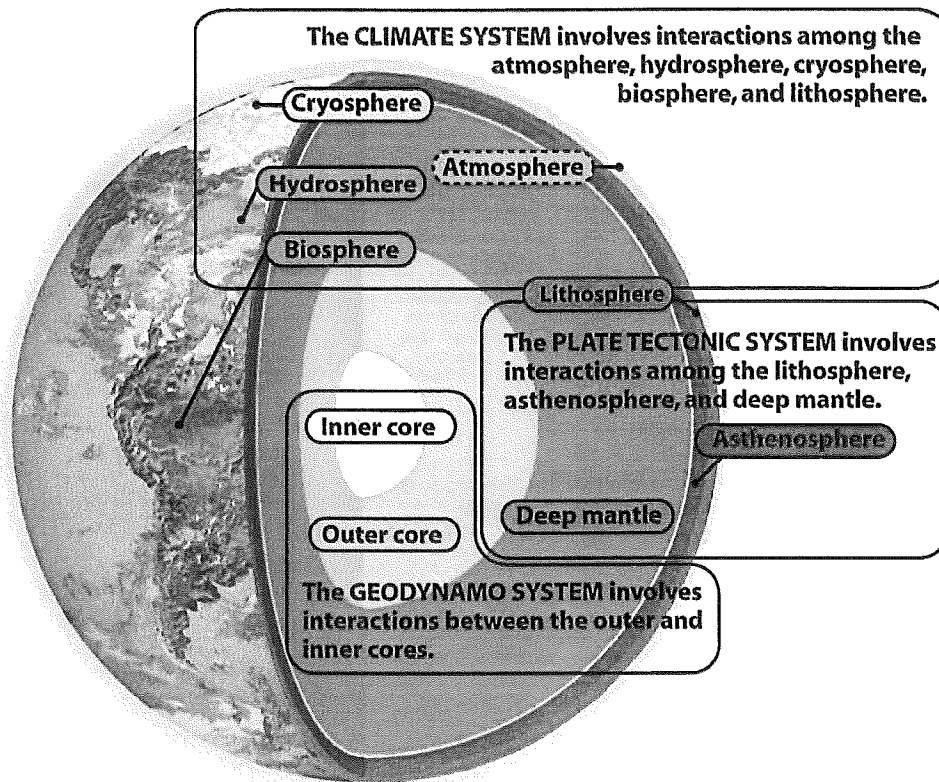


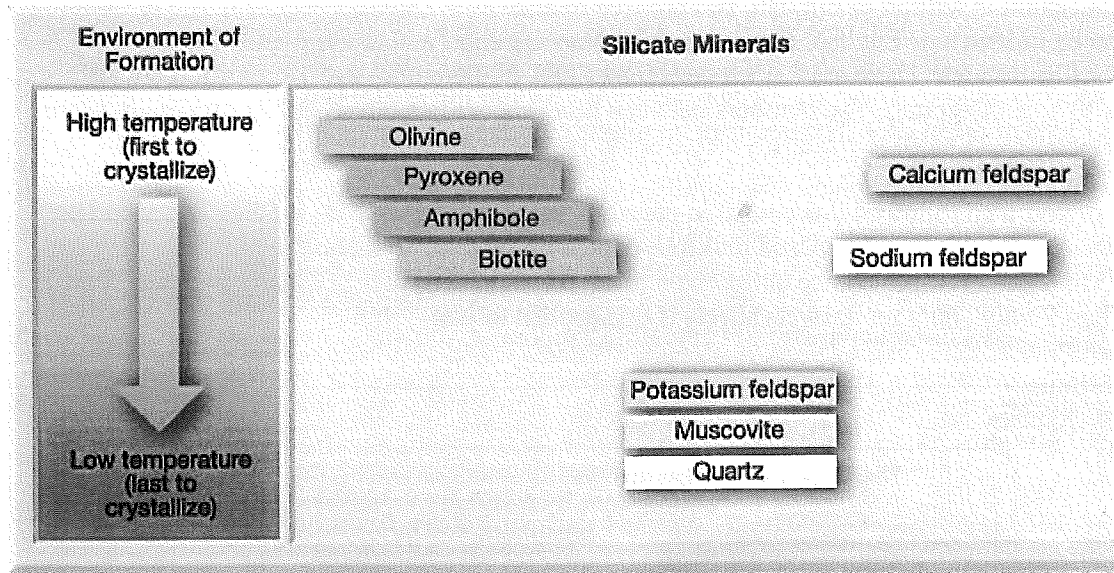
Figure 1-10 part 1
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Above you see a schematic overview of the Earth systems. Provide a short description of the different components of the three systems as mentioned, from Atmosphere to Inner Core (9 in total) and indicate their primary energy source. (18)

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2. Minerals

- Give a brief definition of a mineral (4)
- Explain the origin of cleavage in minerals (cleavage is “splitsing” in Dutch) (4)



- The figure shows the Bowen's reaction series. The figure normally includes the susceptibility to chemical weathering, add this information to the figure (Sketch) and shortly explain the figure (caption style). (6)

3. Plate tectonics

- Briefly explain the theory of plate tectonics (4)
- List three types of evidence for continental drift (6)

4. Geologic time

- Before absolute dating techniques became available, geologists used relative dating methods to determine the relative ages of rocks. Relative dating consist of seven principles/ rules/laws.

- Principle of Superposition
- Principle of Original Horizontality
- Principle of Original Lateral Continuity
- Principle of Uniformitarianism
- Principle of Biological Succession
- Principle of Cross-Cutting Relationships
- Principle of Inclusions

Describe each principle (7).

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b) Geologists have used these stratigraphic principles and cross-cutting relationships to establish a relative chronology. Describe the order of events that led to the relationships visible in this cross section. There are 8 events that can be described. (15)

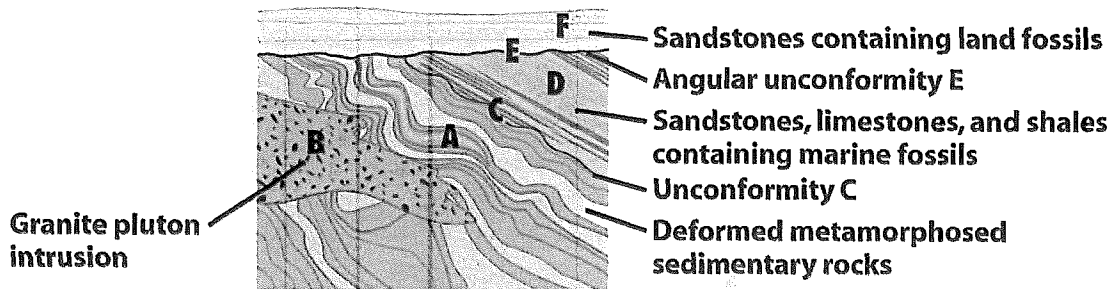
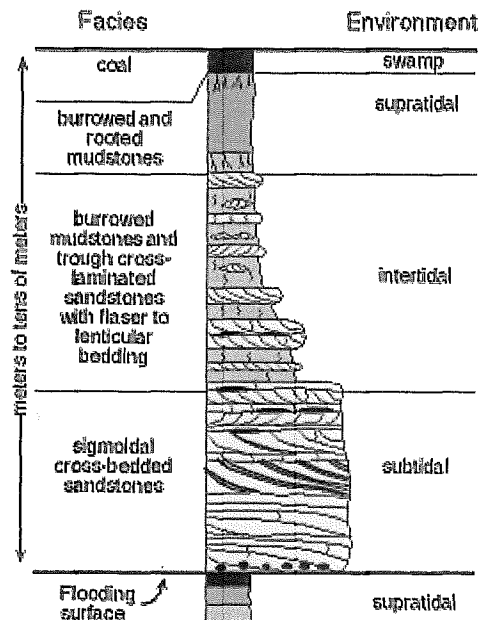


Figure 8-10_part 1
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5. Coastal systems

a) Name the units into which deltaic systems are generally classified? (3)



- b) Which typical coastal setting is described in the figure and why do you think so? (5)
 c) Using Walther's Law of Facies, that states that the vertical succession of facies reflects lateral changes in environment. Can you argue what type of deposits will be found near the surface in a seaward direction? (5)

6. Evolution of barrier coasts.

- a) Draw and describe a cross-section through a barrier coast under stable sea-level conditions (9);
 b) Draw and describe a cross-section through a barrier coast after a period of rapid sea-level rise (5)
 c) How can we reconstruct sea-level rise from peat deposits? (5);
 d) Which type of deposits may be used to reconstruct sea-level fall? (5).

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7. *Sedimentary rocks*

- a) How do limestones differ from clastic rocks? (6)
- b) Describe shortly the different types of carbonate factories. Also provide a sketch of their morphologies and production profiles. (8)

8. *Climate and Geology*

- a) The alternation between glacial and interglacial ages observed during the Pleistocene is best explained by the Milankovitch cycles. These cycles cause periodic variations in the amount of heat Earth receives from the Sun. Cycles can be summarized as Eccentricity, Tilt and Precession, shortly explain these processes and indicate the time interval of one cycle (sketch if necessary). (8)
- b) Milankovitch calculated these cycles in 1920-30's, however these cycles were not proven until 1970's when independent evidence were found in field data. What is the major source that gave proof the Milankovitch theory? (5)

Ten multiple-choice questions:

1. Reverse faults are those in which the hanging wall..
 - a) moves in a horizontal direction
 - b) moves down relative to the footwall
 - c) moves up relative to the footwall
 - d) moves in an oblique direction
2. A rift valley is special form of..
 - a) tectonic valley produced by plate divergence
 - b) tectonic valley produced by plate convergence
 - c) river valley produced by an abrupt change in gradient
 - d) V-shaped river valley
3. Basalt and gabbro have the same..... but different ..
 - a) textures, compositions
 - b) compositions, textures
 - c) cooling history, temperatures of formation
 - d) amount of orthoclase, amounts of ferromagnesium
4. The deep burial of sediments in a large sedimentary basin would be an example of:
 - a) Hydrothermal metamorphism
 - b) Regional metamorphism
 - c) Cataclastic metamorphism
 - d) Burial metamorphism
5. Andesitic composite volcanoes would be most likely to form..
 - a) on a mid-ocean ridge
 - b) in the middle of a continent, away from all plate boundaries
 - c) over a hot spot
 - d) near an area of active plate subduction.

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6. During the last ice age (18,000 yr BP) the sea level was..

- a) ~ 30 m lower.
- b) ~ 60 m lower.
- c) ~ 120 m lower.
- d) comparable to present day levels.

7. If a stratigraphic sequence is missing a layer that should be present, the sequence is said to have:

- a) an angular unconformity
- b) a graded bed
- c) an unconformity
- d) a cross-cutting relationship

8. Damp sand has a higher angle of repose than dry sand because of

- a) adhesion
- b) cohesion
- c) surface tension
- d) cementation

9. The largest particles being moved by a stream will be part of the

- a) dissolved load
- b) suspended load
- c) bed load
- d) overbank load

10. If we drilled down through an atoll, what rock(s) would we encounter?

- a) granite
- b) limestone
- c) predominantly metamorphic rocks
- d) basalt overlain by limestone