

University of Dublin

Trinity College

Matriculation Examination

Trinity Term, 2021

Geology

To be completed by Tuesday 13 April (5pm)

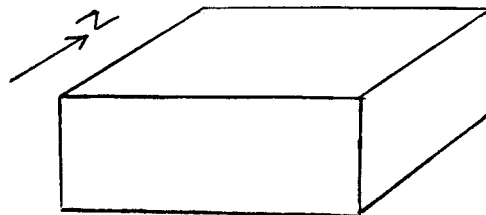
Professor Patrick N. Wyse Jackson

Answer only **five** questions, **illustrating your answers with appropriate diagrams.**

If you answer more than five questions please note that **only the first five in your script will be corrected.**

Credit will be given for citing appropriate examples of geological features you have seen in the field or are familiar with.

1. Describe the geological processes that lead to the movement of lithospheric plates (5 marks). Draw two diagrams showing cross-sections through (1) a subduction zone with an associated volcanic island arc, and (2) a mid-oceanic constructive boundary (10 marks). What are the various rock types produced at each? (5 marks).
2. Minerals may be important rock-formers or may have significant economic value. For each of the following pairs of minerals describe and compare their distinguishing features and state a commercial use for each: (a) Halite and Barytes; (b) Pyrite and Sphalerite; (c) Quartz and Calcite; (d) Gypsum and Fluorite (Fluorspar). List the chemical formula for each mineral.
3. Draw **four** separate block diagrams viewed from the south-east (as shown) to illustrate the following geological structures: (a) strata dipping east at 25° , (b) strata dipping west at 50° cross-cut by a sill as well as a north-south trending vertical dyke, (c) horizontal strata faulted by a normal fault dipping 60° to the west, and (d) a north-south trending asymmetrical anticline plunging 20° to the north with limbs dipping at 40° to the east and 30° to the west (5 marks for each part).



4. Write short notes on **each** of the following topics: (a) Coal Mining in Ireland; (b) Fracking and Ireland; (c) Navan mine; (d) Ireland's offshore gas fields. Illustrate your answer where appropriate (5 marks each).
5. What were the major steps in the evolution of the vertebrates from their origin to the emergence of *Homo sapiens* and when did these steps occur in the geological record? In your answer include a discussion of the major adaptations that made vertebrates successful terrestrial organisms.
6. Describe the similarities and differences between **each** of the following pairs of fossil organisms (1) Graptolites and Bryozoans; (2) Brachiopods and Bivalves, and state the environment in which each generally lived. Provide a drawing of each of the four organisms and on them label their major morphological features (20 marks).

7. Write a short essay on the rock cycle and discuss the geological settings in which the three major rocks types are formed. How can these lithologies be distinguished one from another? (15 marks). List ten rock types (two igneous, five sedimentary, and three metamorphic) and state in which county in Ireland they are found (5 marks).
8. Write short notes on **two** of the following topics: (a) Microfossils; (b) Cleavage in minerals; (c) Earthquake waves; (d) The hydrological cycle. Illustrate your answer where appropriate (10 marks each).
9. Write a short essay on the Pleistocene in Ireland. In it discuss the characteristics of a landscape that has been subjected to glaciation, and outline the main products of glacial deposition. Is there any evidence of earlier glaciations seen in rocks in Ireland?
10. How old is the Earth? (5 marks). What are the methods by which the absolute and relative age of rocks of the planet can be determined? (10 marks). In a succession of sedimentary rocks what evidence can be obtained from them to work out if they are the right way-up or if they have been overturned? (5 marks)

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Instructions to candidates:

Provide your name and examination number at the top of page one.

Type out your answers in MS Word. WORD COUNT: 600 words maximum per question. If you wish to add your own drawings please photograph these and insert these images at the appropriate place in the document. Ideally keep files to smaller than 10MB so that they can be emailed.

Return the completed assignment to the Academic Registry in Trinity by no later than 5pm on Tuesday 13 April.

Answer only **five** questions, illustrating your answers with appropriate drawings. If you answer more than five questions please note that only the first five in your script will be corrected.

Credit will be given for citing appropriate examples of geological features you have seen in the field or are familiar with.

Begin each answer on a new **page**.