

University of Dublin

Trinity College

Matriculation Examination

Trinity Term, 2023

Geology

19 April 2023

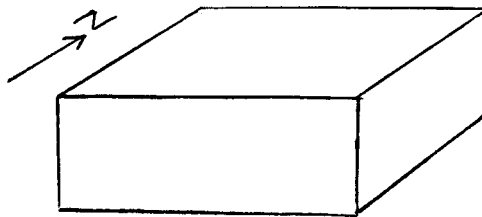
Professor Patrick N. Wyse Jackson

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, features, and rocks associated with an island arc, and provide a sketch cross-section across an island arc system (15 marks). How do rocks produced at this part of the Earth's crust differ to those found in continental crust? (5 marks)
2. How old is the Earth? (3 marks) Explain the principles of radiometric dating (7 marks). Describe the appearance and geological origin of both granite and basalt, and name and state the chemical formulae of three minerals normally present in granite (10 marks).
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° and intruded by a dyke orientated east-west, (c) strata folded into a symmetrical anticline that plunges at 30° to the north, and (d) strata dipping west at 70° overlain unconformably by strata dipping SE at 20° . (5 marks for each part).



4. Write short notes on **each** of the following topics: (a) Fracking; (b) Coal in Ireland; (c) Copper mining in Ireland; (d) Stone quarrying in Ireland. Illustrate your answer where appropriate (5 marks each).
5. Define the term 'orogeny' (5 marks). For two such orogenies that affected Ireland's rocks discuss the evidence seen in Ireland in the geological record that demonstrates that these events took place (10 marks). When did these happen? (5 marks).
6. For each of the following fossil organisms (a) Crinoids; (b) Trilobites; (c) Graptolites, state their mode of life, and the environment in which each generally lived (10 marks). Provide a drawing of each of the organisms and on them label their major morphological features (10 marks).
7. What evidence is there that demonstrates that Ireland was once glaciated? Discuss the evidence for both glacial erosion and deposition (15 marks). When did the last glaciation happen, and what might have caused it? (5 marks).

8. What caused mass extinctions in the past and when did these major events occur? (5 marks). Compare and contrast the morphological and biological characteristics of dinosaurs and mammals? (10 marks). Give the geological range of each group (5 marks).
9. Many minerals are valuable commercially while others may be less so. How would you distinguish between each of these pairs of minerals: (a) gypsum/barytes; (b) quartz/calcite; (c) pyrite/sphalerite; (d) olivine/malachite? (16 marks). Provide a commercial use for one mineral from each pair (4 marks).
10. Write a short essay on sedimentary rocks. In it discuss how sedimentary rocks are classified Name four different examples of sedimentary rocks and state where in Ireland they are to be found. Outline the type of environment in which they were originally deposited (20 marks).