



GCE MARKING SCHEME

SUMMER 2018

**GCE (LEGACY)
GEOLOGY - GL5 (OPTION 1)
1215/01**

INTRODUCTION

This marking scheme was used by WJEC for the 2018 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCE GEOLOGY - GL5 (LEGACY)

OPTION 1

SUMMER 2018 MARK SCHEME

SECTION A

1. (a) (i) Arrow pointing SE between epicentre and B (1) [1]
- (ii) Sediment from channel/continental slope (1) [3]
Disturbed by earthquake (1) sediment mixture denser than sea water (1)
Flows downslope because of gravity (1)
Max 3 marks
- (iii) 150km/124mins (1) [2]
 $1.2 \text{ or } 1.21 \text{ km min}^{-1}$ (1)
- (b) (i) Coarser beds at Y (coarse sand to granules) (1) [2]
Thicker beds at Y (1-1.5 m thick) (1)
Erosive surfaces at Y (1)
Max 2 marks
- (ii) Higher energy level (faster current) at Y (1) [4]
Closer to end of submarine canyon (1)
Steeper slope of submarine fan (1)
Flow hadn't split into channels (1)
Proximal environment (1) can erode finer sediment from last flow (1)
Coarser sediment deposited first (1) more sediment to be deposited (1)
Credit other acceptable answers
Max 4 marks
- (c) Hjulstrom curve derived experimentally (1) [3]
Relationship between flow velocity and grain size (1)
Shows range of velocity that will erode, transport and deposit grains (1)
Allows geologists to apply uniformitarianism (1)
To reconstruct current velocity from grain size of sediments (1)
Credit other acceptable answers
Max 3 marks

SECTION B

2. “The study of modern carbonate environments enables us to interpret the link between process and product.”
Evaluate this statement with reference to the interpretation of ancient carbonate environments.

Biological processes

Algal secretions. Reef building. Reef deposits containing corals and other fauna. Conditions for coral growth (temperature, depth, light). Symbiotic relationship with algae. Remains of marine algae – Coccoliths. Frequently bioturbated. Burrows preserved with other fossils. Analogy with modern calcareous oozes. *Example: chalk.*

Physical Processes

Energy of environments. Wave action of sea in warm shallow lagoon transporting ooids / pisoliths. High energy environment, relationship of ooid size and energy levels. Eroded clasts of limestone. Fossil fragments – shell lags. Low energy back-reef lagoons. *Example: oolitic limestone.*

Chemical processes

Calcareous precipitate from evaporation of seawater. Formation of ooids. Precipitation of micrite in back-reef basin / lagoon with shallow marine fossils.

Evaluation of uniformitarianism. Must be related to processes for access to full marks.

[25 marks]

3. (a) *Describe the evidence from fossils for climatic fluctuations in Britain during the Quaternary period.*

- (a) Various organisms can be used as proxy data for palaeoclimate as their distributions change in response to changing climates

Pollen

Well preserved, easily fossilised abundant material

Sampled from sediments of different types, particularly lake deposits

Relative abundance of pollen types used to reconstruct vegetation community

Glacial/pretemperate climate dominated by Juniper & Birch

As climate warms vegetation dominated by deciduous trees (Oak, Elm, Alder)

As climate cools, conifers (Pine & Fir) begin to dominate followed by Birch

Use of Pollen diagrams to present data

Doesn't allow for quantified climatic reconstruction

Only reconstructs a proxy for the climate

Vertebrates

Examples of Quaternary vertebrates – Woolly Mammoths, Hippopotamus, Hyena, Bison etc.

Application of uniformitarianism – relating modern mammals to fossils

Mammoths found preserved in glacial ice. Heavy fur coats as an indicator of colder conditions.

Use of individual species, rather than community, to reconstruct climate – mutual climatic range

Problems of fossilisation for large vertebrates

“Snapshot” of climatic conditions rather than continuous sequence

Other

Credit for other organisms used e.g. Beetles, Forams (for Oxygen isotopes)

- (b) *Evaluate the use of radiocarbon (^{14}C) dating in establishing a timescale for these climatic fluctuations.*

Timescale provided by dating ONLY organic material by ^{14}C dating

Can date the actual fossil material being studied

Small quantities of radioactive ^{14}C incorporated into living organisms from atmosphere

Dates wood in submerged forests or carbonate in shells from raised beaches

Accurate dates

Decays over time / short half-life of 5730 years

Problems of short period of time that can be accurately dated (40-60,000 years BP)

Problems of contamination & variation in production rates of ^{14}C

Could use other techniques such as Zone fossils within Quaternary for relative dating and correlation.

Must evaluate for access to full marks

[25 marks]

4. *Evaluate the role of:*

(a) *geological structures and bodies*

Dipping Strata

Cuesta (Downs)

Folds

Hills from anticlines (Pennines)

Mountains from core of synclines (Snowdonia)

Fold mountain chains (Himalaya)

Faults

Rift Valleys (Rhine, East Africa)

Faults as planes of weakness (Great Glen Fault)

Fault scarps (Craven Fault)

Thrust faults (Moine thrust)

Joints

Tors (Dartmoor)

Limestone Pavements (Yorkshire Dales)

Igneous Bodies

Plutons creating highland areas (Dartmoor, Mourne Mtns)

Volcanoes (Arthur's Seat, Deccan Plateau)

Resistant Rock

Monadnocks (Malvern Hills, Wrekin)

Coastal features

(b) *glaciation*
in the formation of a variety of relief forms.

Landforms – related to glacial erosion

Cwm (corrie/cirque), arête, hanging valley, glacial trough, roche moutonee etc.

Landforms – related to glacial deposition

Moraines (terminal, recessional) drumlins, crag and tail

Glacial erosion modifies the pre-existing landforms and structures rather than forming them.

Credit to be given for examples of landforms illustrating ideas

Breadth v depth

Must evaluate for access to full marks.

[25 marks]