GCE MARKING SCHEME

SUMMER 2018

GCE (LEGACY)
GEOLOGY - GL5 (OPTION 3)
1215/03

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 3

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SECTION A

1. (a) (i) AAPT in correct location (1) [4]
Anticline plunge to WNW (1)
SAPT in correct location (1)
Syncline plunge to ESE (1)
Credit both AAPTs plotted in correct locations but incorrectly labelled (1)

(ii) Variscan (1R) [3]
Any 2 from
Trends WNW-ESE (1)
Formed by NNE- SSW compression (1)
Deforms Carboniferous rocks (1)
Located in southern Britain (1)

(b) (i) Any two from: [2]
Originally just above sea level (0-0.5m) (1)
Then rapid deepening to 90m depth (0.5-2m) (1)
Then shallowing to 15m (2-3m) (1)
Then sea level remains constant and shallow at 15-25m (3-5m) (1)

(ii) One mark for mechanism (1) [2]
e.g. ice sheet growth (glacial period)/ ice sheet retreat (interglacial period)/ Milankovitch/ eustatic change/ isostatic change/ delta switching/ subsidence/ sediment loading-compaction

One mark for valid description of how the mechanism can alter sea level (1)

(c) (i) MFS at 2 or 9m depth (1) [2]
TS at 0.5 or 7.6m depth (1)

(ii) Any two from: [2]
Fluvial/non marine/terrestrial sandstones **because** they are arkose/have soil horizon/have rootlets (1)
Erosively on top of (1)
Siltstones were marine **because** of brachiopod content (1)

[15 Marks]

SECTION B

2. (a) Explain how evidence from fossils may be used to distinguish between different environments of deposition. Make reference to examples from the British geological record.

(b) Evaluate the reliability of this fossil evidence. [25]

(a) Deep marine environments identified by presence of graptolites e.g. lower Palaeozoic Welsh basin black shales and cephalopods e.g. Mesozoic ammonites of the North Sea basin. Shallow marine environments identified by presence of trilobites e.g. lower Palaeozoic Anglo-Welsh shelf facies, corals e.g. upper Palaeozoic (Carboniferous) limestones and brachiopods e.g. Mesozoic limestones of southern England.
Non marine environments (fluvial/deltaic) identified by presence of bivalves e.g. upper Palaeozoic (Carboniferous) Coal Measures black shales and plant remains e.g. Mesozoic Wealden Beds of southern England.

(b) Reliance on the principle of uniformitarianism. Many fossil groups now extinct e.g. graptolites/trilobites/ ammonoids so difficult to interpret. Role of diagenesis and metamorphism. Evidence more reliable therefore for more recent sediments. Importance of preservation potential and bias of the fossil record to particular environments.

3. (a) Describe the sedimentary and fossil evidence for significant climatic change associated with Britain drifting northwards across the Equator during the Late Palaeozoic.

(b) Evaluate the reliability of palaeomagnetic evidence for this change in latitude. [25]

(a) Devonian (south of equator = 'Namib' desert) and Permian (north of equator = 'Sahara desert')- arid: 'red-beds', desert dunes, wadi breccias, rare playa lake and evaporite sediments. Paucity of fossils. Also tropical Devonain limestones and associated fossils of Devon area.
Carboniferous- equatorial: shallow sea tropical marine limestones, non-marine equatorial coal/swamp sediments. Abundance of fossil evidence including brachiopods, corals, trilobites (marine) and plant (non-marine)

(b) Reliable data will give low angle magnetic inclination, decreasing to zero and then to a low angle again. But technique relies upon many factors:
Assumes dipolar field
Assumes rocks undisturbed i.e. no corruption of data e.g. tectonic/ metamorphism/ Curie temps.
Assumes geographic and magnetic poles close together i.e. uniformitarianism.
Inaccuracies in radiometric dating methods of sediments and accuracy of obtaining very weak remnant magnetism in rocks.

4. '*The Caledonian orogeny has had a more significant effect than other orogenies on the geology of the British Isles'*.

Describe and evaluate the geological evidence which supports this statement. [25]

Description

Structural evidence: Moine Thrust along NW margin of orogenic belt, large scale folding and nappes in Scotland, formation of major faults such as HBF and GGF, NE-SW structures in Scotland, Lake District and Wales, accretionary wedge in Southern Uplands.
Igneous evidence: Granite intrusions in Scotland and Lake District. Less so in Wales. Andesites e.g. Lake District. Ophiolites obducted ocean crust- e.g. Ballantrae.
Metamorphic evidence: Widespread regional metamorphism e.g. Barrow's zones in Scottish Highlands, slate belt in N. Wales.

Evaluation

An evaluation the effects of the Caledonian orogeny with those of the Alpine and Variscan orogenies in terms of either/or regional, structural, igneous and metamorphic legacy. Much greater area affected by Caledonian orogeny with generally more intense folding, faulting (nappes), metamorphism (inc high grade regional) and larger scale magmatism and volcanism. But locally (SW England and S Wales) Variscan more evident (Caledonian forms basement) and locally (S England) Alpine more evident.