GCE MARKING SCHEME

SUMMER 2017

GEOLOGY GL5 - THEME 1
1215/01

INTRODUCTION

This marking scheme was used by WJEC for the 2017 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 THEME 1

QUATERNARY GEOLOGY

SUMMER 2017 MARK SCHEME

1 (a) Erratics (1) striations (1) roche moutonnée (1) drumlins (1) crag and tail (1)
max 1 of these
+(1) for development [2]

(b) (i) Cross cutting relationship of moraine ridges (1) furthest moraine in direction of ice flow (1) terminal moraine (1)
(max 1 mark) [1]

(ii) Recessional moraines (1) deposited as rate of ablation greater than movement (1) ice snout stationary for period of time (1) glacier retreating (1)
(max 2 marks) [2]

(iii) More meltwater (1) moraine ridge damming valley (1) lake in a bowl-shaped valley (1)
(max 2 marks) [2]

(c) (i) 200 mm/75 laminations (1) = 2.67mm (1) [2]

(ii) Periglacial environment (1) higher energy - coarser grains/lower energy - finer grains (1) more energy in summer (1) with meltwater (1) lower energy in winter (1) related to seasonal ice melting (1) varve deposit (1) cyclical (1)
description only – max (1)
(max 3 marks) [3]

(iii) As the glacier retreated (1) energy level of flow decreased (1) sediment supply decreased (1) more sediment deposited before the lake (1)
description only – max (1)
(max 3 marks) [3]

Total 15 marks

2. “Resistance to erosion of bedrock is the most significant factor in determining the topography of a place.”
Evaluate this statement. [25]

Resistance to erosion is significant. The relaitive resistance to erosion of rocks within geological structures is the most important factor in determining topography.

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

Discussion of other factors that might influence landscapes, such as glaciation.

Must evaluate the importance of resistance to erosion for full marks

Credit examples given

Breadth v depth

Total 25 marks

3. (a) Describe the link between continental ice sheets and sea level change during the Quaternary.

(b) Evaluate the significance of ice core evidence in explaining Quaternary climatic change. [25]

(a) Isostatic sea level change in response to mass of ice locally on the continents, displacing the mantle. Isostatic change is more localised phenomenon that can be more directly related to local quantity of continental ice.

Eustatic sea level changes in response to changing volumes of continental ice and seawater during glacial/interglacial cycles. Eustatic change is a global phenomenon.

Two cycles of sea level change are superimposed (and their differing rates) which create the landforms and evidence seen today.

Link is directly causal. However there are two ways in which the sea level is influenced by the continental ice whose effects must be considered together in order to interpret the landforms and deposits found around the coast.

(b) Continuous records can be obtained from drilling where ice has accumulated for a long time, (Antarctica, Greenland).

Inclusions in the snow of each year remain in the ice, such as wind-blown dust, ash, bubbles of atmospheric gas and radioactive substances.

Water molecules containing heavier isotopes have a lower vapour pressure, when the temperature falls, the heavier water molecules will condense faster than the lighter water molecules. The relative concentrations of the heavier isotopes in the snow indicate the temperature of condensation at the time, allowing for ice cores to be used in local temperature reconstructions.

Air bubbles trapped in the ice cores allow for measurement of the atmospheric concentrations of trace gases such as: carbon dioxide, methane and nitrous oxide.

Volcanic eruptions leave identifiable ash layers that can be dated. Dust in the core can be linked to increased desert area or wind speed.

Tectonic activity (such as in Indonesia) can cause sea level change unrelated to continental ice sheets. Changing volume of ocean basins occurs over long time periods.

Total 25 marks

4. (a) Describe how modern sedimentary environments can enable the reconstruction of former environments.

(b) Evaluate the significance of grain composition and texture in determining the biological, physical and chemical processes that form **carbonate** sediments. [25]

(a) Uniformitarianism – processes operating today are the same as in the past. Reconstruction of earlier sedimentary environments by recognition of similar sedimentary sequences produced by same processes. Reconstruction of Lower Carboniferous/Silurian/Jurassic carbonates but could use other examples e.g. turbidites or coastal lithologies (sands, muds, pebble beds, dunes), bed geometries (channel fill), sedimentary structures (ripples, cross bedding, desiccation cracks), organic forms (bivalves, trails, burrows).

(b) This mark scheme is based on Folk's classification. Others are acceptable.

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
Examples: chalk, biomicrite/sparite

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
Examples: oolitic limestone, intraclasts, micrite

Chemical processes
Calcareous precipitate from evaporation of seawater
Formation of ooids
Precipitation of micrite in back-reef basin/lagoon with shallow marine fossils
Deposition as deep water muds with plankontic fossils

Must be related to processes for access to full marks and must have evaluation of the relative importance.

Total 25 marks