GCE MARKING SCHEME

SUMMER 2019

GCE (LEGACY)
GEOLOGY - GL3
1213/01

INTRODUCTION

This marking scheme was used by WJEC for the 2019 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 - GL3 (LEGACY)

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Question 1

(a) (i) W to E (eastwards)
Build up of sand at breakwater (1) [1]

(ii) West Bay -increase in shoreline as sand is trapped (1)
East Bay - decrease in shoreline – beach deficit (1)
(max 2 marks) [2]

(b) (i) D/T = rate e.g. 50/15 = 3.3 my^{-1}
(1) (1) [2]

(ii) with = 16 (range 15-17) (1)
without = 66 (range 65-67) (1) [2]

(iii) Incorrect/does not prevent landward retreat/erosion (1)
Erosion continues at the same rate (1)
Beach nourishment simply restarts the clock (1)
Evidence – graph restarts at the same gradient (1)
(Max 3 marks) [3]

(c) Sand absorbs wave energy/requires energy to move the sand (1)
Without beach the waves will directly erode the base of the cliff (1) [2]

Total 12 marks

Question 2

(a) (i) Confined aquifer (1)
Artesian (1)
Pore water under pressure (1)
Water-table has been artificially reduced (1)
Reference to hydraulic head of water (1)
(max 2 marks) [2]

(ii) Water shortage/well runs dry (1)
Cone of depression near base of borehole (1)
or
Saline incursion (1)
Saline/fresh interface is rising towards boreholes (1)
(max 2 marks) [2]

(b) (i) 3 or more grains touching (not crystalline) (1)
Appropriate size (1)
Showing good pore space (1)
Well sorted (1)
(max 2 marks) [2]

(ii) Pores too small (1)
Pores not connected (1)
Pores filled with cement (1)
(max 2 marks) [2]

(c) (i) Two from:
Crystalline rock – impermeable
Low seismicity – stable ground
Minor groundwater flow - erosion
Beneath the aquifer - contamination [2]

(ii) Holistic
Any leakage with time may be directed to the town's water supply boreholes
Saline groundwater prevents radioactive water escaping under the sea – density difference in water
Faults may reactivate in time – changing groundwater flow
Sea-level changes may adversely affect the groundwater pattern
Climate change – increase in groundwater [3]

Total 13 marks

Question 3

(a) Describe how the magnitude and intensity of earthquakes can be measured. *[10]*

Richter – magnitude, energy released/strength, logarithmic scale with no limit. Same value for each event, scale explained (each point = 10 times amplitude of shaking, 30 times energy released. Seismometer, amplitude of waves v distance to focus/time interval between P & S arrivals.

Modified Mercalli Scale – intensity, based on observations of damage caused, values vary, 12 levels (*I – XII)*. Questionnaires, human perception.
(Max 10)

(b) With reference to a named major earthquake(s), explain the factors that affect the intensity of earthquake damage. *[15]*

Named case study(ies) (max 10 without)
Factors – Size on the Richter scale/energy/strength
Depth
Distance from epicentre
Ground conditions (liquefaction)
Building standards
Development status (LEDC/MEDC)
Level of preparedness
Other sensible (secondary effects – tsunamis/flooding/landslides etc.
(Max 15)

Total 25 marks

Question 4

(a) *Explain why dangerously high concentrations of radon gas are found in some buildings in Britain.* *[10]*

Radon defined
Impact of radon on human health.
Natural release from radioactive decay.
Sources and pathways.
Granite - high risk areas (SW England).
Radon dissolves in water and transported in groundwater.
Released when pressure drops/near surface.
Trapped by some rock types (clay) but released to atmosphere to be trapped (denser than air) by poorly ventilated/well insulated buildings (cellars, attics, roof and floor voids).
(Max 10)

(b) *Describe how the foundations of large structures can be affected by unfavourable geology leading to problems of ground instability.* *[15]*

Unfavourable geology to include:
1. Unstable patterns of geological structures: e.g. bedding, jointing, faulting, cleavage effect of dip of beds/cleavage.
slope faces daylight.
stable friction angles (beds and slopes)
fracturing of fault planes.
density of joints.
lubrication by water (seismic effects)

2. Affect of water on stability - porosity v permeability.
pore pressure,
rock type,
lubrication,
liquification in earthquake prone areas.
effect of fluctuating water tables e.g. London.

3. Others – e.g Rock type- Limestone, clay,
Case studies credited.
(Max 15)

Total 25 marks

Question 5

(*a*) *Describe **two** geological hazards associated with a **named** volcanic eruption at a convergent plate boundary.* *[10]*

Two from: Blast/explosion
Pyroclastic flow
Ash fall
Volcanic gases
Lava flows
Debris flows
Lahars

(5 marks per hazard linked to a named volcanic event on a divergent plate boundary – maximum 7 marks if no named eruption or not on a convergent margin).

(b) Assess the effectiveness of the monitoring techniques used to predict eruptions. [15]

At least ***two*** from
Ground deformation – tiltmeters/EMDs
Gravity anomaly changes
Thermal anomalies
Gas emissions – SO_2
Seismic activity changes

Must assess/evaluate the effectiveness – possibly with reference to case studies (max 10 marks if just no evaluation)

Total 25 marks

MARK BAND CRITERIA FOR AS ESSAYS.

Summary Description	Mark out of 25	Mark out of 15	Mark out of 10	Criteria
Excellent	21 - 25	13-15	9-10	Not the perfect answer but purposeful, demonstrating a secure grasp of knowledge and understanding and few significant omissions. Well-supported and illustrated with detailed examples selected from named geological situations. Ideas expressed fluently in logical form using appropriate geological terminology. Few errors in grammar, punctuation and spelling.
Good/Very good	16 - 20	10-12	7-8	Sound answers with relevant material providing evidence of good knowledge and understanding. May be limited in terms of supporting material and breadth of coverage but appropriate examples selected. Ideas expressed with clarity with only occasional errors in grammar, spelling and punctuation.
Modest/ Quite Good	11 - 15	7-9	5-6	A reasonably secure grasp of basics but some deficiencies in knowledge and understanding although use is made of geological terminology. Examples and illustrations may lack detail or may not relate to real geological situations. Reasonable use of language with adequate spelling and punctuation.
Weak/ Minimal	6 - 10	4-6	3-4	Answers show limited basic knowledge and understanding, lacking directness and organisation; tendency to rehash prepared material and answer by inference. Superficial use of examples. Deficiencies in use of language evident; weaknesses in spelling and punctuation apparent.
Very weak	1 - 5	1-3	1-2	Little evidence of knowledge and understanding with erroneous or repeated material evident. Candidate is unable to address the question. Largely irrelevant; possibly too brief. Language skills poor, with spelling, grammar and punctuation errors becoming obtrusive.

Incorporated into this mark scheme is the assessment of candidates on their ability to organise & present information, ideas, descriptions & argument clearly & logically, taking into account their use of spelling, punctuation & grammar.