GCE MARKING SCHEME

SUMMER 2019

GCE (LEGACY)
GEOLOGY - GL5 (OPTION 4)
1215/04

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 - GL5 (LEGACY)

OPTION 4

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SECTION A.

1. (a) (i) Earth's magnetic N & S poles in same position as today (1)

(ii) Arrow in appropriate location (1)

(iii) straight line starting at the origin (1)
straight line passing through point 100km, 2Ma (1)

(iv) evidence of 10 reversals (1)
0.4 Ma (1)

(v) basalts/igneous rocks (1)
containing iron minerals (1)
identify magnetic flips/polarity changes (1)
radiometric dating/ absolute dating (1)
named dating technique (1)
Any 3

(b) (i) along ridge in Pacific Ocean (1)
adjacent to trench in western part of Pacific Ocean (1)

(ii) False (1R)
Ocean ridge is central in Atlantic/ off-centre in Pacific (1)
Ocean basin smaller in Atlantic (younger)/ wider in Pacific (older) (1)
Few trenches in Atlantic/ Pacific surrounded by trenches (1)
Limited subduction in Atlantic/ well underway in Pacific (1)
Slower spreading rate in the Atlantic (1)
Any 4

Total [15] Marks

SECTION B

2. (a) Describe the characteristic geological processes that form orogenic belts.

- continent-continent collision
- continent-island arc collision
- cordilleran mountain belt formation,
- ophiolites
- accretionary prisms
- partial melting and granitic magmatism
- delamination
- isostatic uplift
- gravitational collapse
- structural deformation.

(b) Evaluate the role of isostasy in controlling the altitude of orogenic belts. [25]

crucial role, interplay of erosion/uplift/accretion/crustal thickening. Isostatic disequilibrium at orogenic belts suggests rates of isostatic adjustment cannot keep pace with other processes.

3. (a) Describe how tectonic stresses acting in the continental crust can cause a range of brittle and ductile tectonic structures.

- brittle-ductile definitions
- types of stress and principal stress directions determine elastic/plastic transition depth
- yield strength, fracture points, amount of strain and hence brittle fault types (reverse/normal/strike-slip) and ductile fold types as well as nappes/shear zones etc.

(b) Evaluate the role of temperature in the formation of tectonic structures. [25]

- role of increasing temperature in making rocks more ductile- folding; stress-strain curves
- Temperature increase with depth but so does confining pressure- makes rocks more ductile also.
- Additional influences of competence, fluid pressure and strain rate also affect type of structure formed.

4. Evaluate the use of seismology in understanding the structure and composition of the lithosphere. [25]

- seismology integral especially given limited borehole data in deep crust/mantle
- Ray path modelling enabling identification of lithosphere-asthenosphere boundary. LVZ. Crustal thicknesses- Moho, seismic refraction.
- COCORP and BIRPS seismic reflection data
- Ocean crust layering vs continental crust layering
- Good for structure- link with ophiolites for oceanic lithosphere
- Less good for composition- link with experimental work and boreholes.