GCE MARKING SCHEME

SUMMER 2016

GEOLOGY GL1
1211/01

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INTRODUCTION

This marking scheme was used by WJEC for the 2016 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.

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GCE GEOLOGY GL1

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1. *(a)* (i) Mineral 1 - Orthoclase feldspar (1)

Mineral 2 - Quartz (1)

(ii) Size max 5mm, down to less than 0.5mm (1)

Shape angular to sub-rounded (1)

Sorting poorly sorted/quite poorly sorted (1)

Random orientation of grains (1)

Clastic/fragmental/granular (1)

(iii) Greywacke

(b) Granite is younger than the sandstone as it cuts it (1)

Xenoliths of sandstone within the pluton (1)

Granite has metamorphosed the sandstone (1)

Gneiss is older/underneath the sandstone – superposition **or** sandstone is younger as it is on top of the gneiss – superposition (1)

Top of gneiss is an erosion surface/unconformity (1)

(c) (i) **Y** is clastic/sedimentary; **Z** is crystalline/metamorphic/hornfels (1)

Y is finer-grained; **Z** is coarser-grained (1)

Y may show sedimentary structures; **Z** may show porphyroblasts of new minerals e.g. chiastolite (1)

Y may contain fossils; **Z** fossils will have been destroyed (1)

Credit other sensible suggestions e.g. less matrix in **Z**

(ii) Reasons – has undergone recrystallisation (1)

Due to contact metamorphism (1)

Changes due to heat alone (1)

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2. *(a)* (i) P waves

(ii) 9 000 km

(b) (i) General increase in velocity with depth (1)

But a decrease in velocity in the asthenosphere (1)

Use of numbers from graph (1)

(ii) Density - decrease in velocity (1)

Rigidity - increase in velocity (1)

(iii) Lithosphere/asthenosphere – through the first kink to the left at 100-200 km (1)

Mantle/outer core – 2 900 km where S waves end and P waves slow (1)

Outer core/inner core – where sharp increase of P wave speed at 5 200 km (1)

(c) (i) Reduction in velocity (1)

Drops from 12/13 km to 8 km s^{-1} / drops by 4/5 km s^{-1} (1)

S waves disappear/lost (1)

(ii) Outer core is a liquid (1)

P waves slow down due to decrease in rigidity (1)

S waves cannot be transmitted by a liquid (1)

A liquid cannot be sheared (1)

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3. *(a)* (i) Dips west (1)

Gentle/shallow angle, less than 15° (1)

(ii) Superposition (1)

Triassic older than Jurassic or similar / horizontal/undeformed strata on top of dipping/folded strata (1)

(b) Reverse fault (1)

Hanging wall upthrown **or** footwall downthrown (1)

Fault plane dips towards the upthrown side (1)

Formed by compression/crustal shortening (1)

(c) (i) Suture line

(ii) Ammonites (1)

Suture line is the most complex – very frilly lobes and saddles (1)

(iii) Life assemblage
Fossils generally well preserved (1) – suggests little transport (1)
Range of fossil sizes – suggests range of ages (1)
Presence of juveniles (1)
Random orientation (1)
More than one type of fossil present (1)

Death assemblage
Fossils not complete (1) – broken suggests transport (1)
Most fossils are of a similar size – suggests some sorting by currents (1)
Absence of juveniles (1)
Alignment (1)
Only one type of organism present (1)
Ammonites free swimmers – sink after death cannot be preserved as they lived (1)

Inconclusive – difficult to tell whether it is a life or death assemblage (1)

(d) Can only accurately obtain dates back to about 10 half-lives – 60 000 years (1)

Quaternary goes from present to 2 million years / plant fragments here up to 100 000 years old – therefore carbon-14 is not a suitable method (1)

Award (1) for 'plant fragments contain carbon' if used to support this as a suitable method

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4. *(a)* (i) Axial plane trace drawn through antiform core on surface of the block diagram (1)

Antiformal axis drawn through the antiform on the front face of the block (1)

(ii) Outcrop at **A** has gentle dip (therefore wide outcrop) (1)

Outcrop at **B** has steep dip (therefore narrow outcrop) (1)

(iii) Any one bed inserted parallel to the top edge of the east side of the block

(b) Syncline and anticline (1)

Folds strike N–S (1)

Folds dip to the east and west (1)

Limb lengths unequal – asymmetrical folds (1)

Limbs dip at different angles (1)

Open folds or angular folds (1)

Fold axes dip east (1)

(c) (i) Load casts and flame structures (1)

Any two of following – but max 1 if structures not correctly named

Denser sandstone/sand sinks (1) into less dense shale/mud (1) **or** shale/mud squeezed up between lumps of sandstone/sand (1) Accept post depositional structure (1) associated with de-watering / diagenesis (1)

(ii) Flames in shale always on top of the bed / load casts in sandstone always on the base of a bed / can be used as a way-up structure (1)

Beds in **Figure 4a** are upside down/overturned (1)

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