GCE EXAMINERS' REPORTS

GEOLOGY
AS/Advanced

JANUARY 2012

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Statistical Information

This booklet contains summary details for each unit: number entered; maximum mark available; mean mark achieved; grade ranges. *N.B. These refer to 'raw marks' used in the initial assessment, rather than to the uniform marks reported when results are issued.*

Annual Statistical Report

The annual *Statistical Report* (issued in the second half of the Autumn Term) gives overall outcomes of all examinations administered by WJEC.

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GEOLOGY

General Certificate of Education

January 2012

Advanced Subsidiary/Advanced

Principal Examiner: Mr David Evans

Unit Statistics

The following statistics include all candidates entered for the unit, whether or not they 'cashed in' for an award. The attention of centres is drawn to the fact that the statistics listed should be viewed strictly within the context of this unit and that differences will undoubtedly occur between one year and the next and also between subjects in the same year.

Unit	Entry	Max Mark	Mean Mark
GL1	287	60	35.7

Grade Ranges

A	46
B	41
C	36
D	32
E	28

N.B. The marks given above are raw marks and not uniform marks.

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GL1

General Comments

The GL1 examination tested a wide range of skills including the interpretation of diagrams, a graphic log, photographs, a geological map and geological cross-sections. The paper covered many areas of the specification content and included both straightforward and more complex ideas, making it accessible to a wide ability range.

Q.1 (a) The aim of the question was to test the ability of the candidates to simply describe what they see. A wide range of answers were acceptable and most candidates used technical terminology.

(b) This question was well answered with most candidates noting that the dendroid graptolite is older than A. There was no expectation nor need for candidates to have any knowledge of dendroid graptolites. The question was designed to test basic knowledge of graptolite evolution in a new context.

(c) In part (i) most candidates noticed the reference in the question to older graptolites being fixed. Consequently they commented appropriately on the value of free-floating graptolites as zone fossils. In part (ii) most candidates were able to give two other properties of zone fossils. A few used 'geographically widespread' again and could not be given credit for this if they had answered part (i) correctly.

(d) The calculation involved recognising the minimum age of the rock at Y (468 Ma) and the maximum age of the rock at X (299 Ma). Many candidates coped well with this although a surprising number simply subtracted 468 from 488. In part (ii) the better candidates fully explained the missing rocks in terms of erosion of the beds above Y and the formation of an unconformity as the Permian rocks were deposited.

Q.2 (a) Most candidates were able to measure the thickness correctly and calculate as required in part (ii).

(b) The majority of candidates noted that this was a convergent boundary and offered appropriate reasons for this identification.

(c) The identification of this as a thrust was the most common, and correct answer. Most commented on the low angle of dip the fault plane. Fewer correctly noted the relative downward movement of the footwall block or the upward movement of the hanging wall block.

In the second part of the question, most candidates correctly noted that both plates being of continental lithosphere have the same, relatively low density and hence resist subduction.

(d) It was surprising that many candidates did not simply draw the arrows diverging at right angles to the plate boundary X. Part (ii) was well answered with many candidates gaining full marks.

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Q.3 (a) Most candidates correctly recalled haematite.

(b) Candidates were able to use the graphic log correctly to record the thickness of unit B. In addition there were many excellent answers noting the upward fining of the sequence in C from coarse to medium grain size. The best candidates also correctly noted the fine grain size and lamination as indicative of a low energy environment.

(c) The key aspects to gain full marks included comments on the size, shape and sorting of the grains in Figure 3b. This was well done by the majority of candidates.

(d) To gain full marks candidates needed to link B to aeolian sand dunes (3) and C to the river (2). The justification of these required detailed explanation of the evidence so very simple listing of the evidence was not sufficient to gain marks in this last part of the question. For example, simply stating 'cross bedding' was insufficient to justify a desert sand dune environment, whereas 'large scale cross bedding representing deposition on the advancing face of desert dunes' was the style of answer credited by examiners. Specific explanations of features in the photograph and elsewhere on the graphic log were expected.

Q.4 (a) In part (i) there were many acceptable answers referring to phenocrysts, groundmass, shapes and sizes using the scale. There were many ways to gain the 3 marks available, although obviously 'crystalline' was not one of them since it appeared in the question. The majority correctly identified rock A as a granite in part (ii).

(b) Most candidates noticed the scale difference between the two photographs and therefore the finer crystal size of rock B. The most common additional answer recognised the foliation of B. Part (ii) elicited many excellent responses commenting on regional metamorphism involving high temperature and high pressure.

(c) The final question on the paper included plenty of clues in the map (Figure 4b) and photographs (Figure 4a) but proved to be an excellent discriminator. The best candidates coped well with the evidence of relative age on the map and knowledge of which rocks could contain orthoclase. In addition they also referred back to mineral Z (orthoclase) in the photographs. For candidates who selected the incorrect rock (an answer other than B), credit was still given for aspects of the reasons which were correct.

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GEOLOGY

General Certificate of Education

January 2012

Advanced Subsidiary/Advanced

Chief Examiner: Mr Peter Loader

Unit Statistics

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Unit	Entry	Max Mark	Mean Mark
GL3	526	50	30.3

Grade Ranges

A	35
B	31
C	27
D	23
E	20

N.B. The marks given above are raw marks and not uniform marks.

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GL3

Section A

Section A was generally well done and most of the questions were accessible for all candidates.

Q.1 (a) This question was generally well done by most candidates, describing the hazards indicated by the map. Some candidates not only described but explained the evidence though they received no credit for the latter.

(b) Though most candidates obtained the full 2 marks, some candidates were too vague when describing the direction of flow and a significant number claimed that the flows would 'follow the contours'.

(c) (i) This question was well answered.

(ii) A large number of candidates did not make specific reference to Figure 1b to the extent of stating that the maximum speed ($32ms^{-1}$) was at a height of 12km. Many stated that wind speed 'increases with height'. It was also commonly claimed that 'distance' and 'time' were the important factors without making any reference to wind speed e.g. 'it will travel further as it is higher in the air and has more time to travel before it hits the ground'.

(iii) Most candidates obtained the mark. East was the most popular acceptable answer but some chose south and a few south-east.

(d) This question was very well answered by all candidates.

(e) This question differentiated well. A large number of candidates went for further description of pyroclastic flows and lahars. To gain full marks some discussion of tsunamis was required.

Q.2 (a) Many candidates identified this as a normal or dip-slip fault but a good proportion of those had difficulty explaining why. A significant proportion of candidates sat this paper with no knowledge of GL1 and many were unable to answer this question. On reflection it was agreed by the examiners that the knowledge required was better tested in GL1 and a decision was taken to award both marks to all candidates to ensure that none were disadvantaged. Future GL3 papers will not ask candidates to identify fault types.

(b) (i) Only a minority of candidates gained the 2 marks available. The majority were able to read the relative heights from the graph but the calculation proved to be beyond most candidates. Many just added, subtracted or averaged the heights. Some candidates were confused by the negative signs.

(ii) Most did not comment on the correlation and just compared the two rates of movement. The best candidates referred to the gradients on the graph.

(c) Generally very well done. The most common correct responses discussed the spring, the fault or the rainfall.

(d) A majority of candidates were able to name a suitable technique but often found it impossible to describe it adequately. Responses such as 'a tilt meter may be used to measure the tilt of the land' or 'GPS (lasers or photographs) can measure movement' were commonly seen. Many gave the acronym of Light Amplification by Stimulated Emission of Radiation as LAZER.

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Section B

General Comments

Question 3 was the most popular question chosen by candidates. There continues to be deterioration in spelling; with the most commonly mis-spelt words being porous, pore space, groynes and liquefaction. Candidates did not make use of annotated diagrams as much as they might, which would have aided their communication.

Q.3 (a) The vast majority of candidates were fully conversant with the basics of the Mercalli Scale but when it came to the factors that affect it there was far too much reliance on building design. However, when it came to the finer details there were some misconceptions such as ‘the same earthquake of high intensity in a city would be low in a desert’ and ‘if the buildings are made of wood, this would increase the intensity’.

(b) Electrical resistivity is generally only understood at a basic level. There were very few accurate detailed descriptions of the actual method and weak responses such as ‘it measures the rate at which the waves go through the ground’ were often seen. However, the formation of micro-cracks, movement of water and changes in conductivity were well described.

Earthquake lights were also poorly dealt with. Most candidates were aware of the phenomenon and that it was not common. Various explanations were put forward; the most convincing being electrical activity associated with stressed quartz crystals. Less plausible suggestions were ‘radon gas catching fire’ and ‘earthquake lights get switched on like traffic lights’ prior to an event!

Seismic activity was much better dealt with. The better candidates were able to discuss the nature and possible significance of foreshocks as well as the concept of a seismic gap. Many candidates claimed that seismographs are the ‘graphs of the seismic waves’.

Q.4 (a) This essay was generally not well done. The better candidates considered groynes and sea walls and their possible effects on longshore drift and coastal erosion. However, many discussed wells and sea-water incursion together with very tenuous connections with landfill sites. It appears that many candidates had difficulty with the term ‘major construction project’ in connection with ‘coastal areas’.

(b) Candidates never state the type of dam that they are considering. There are many ambiguous descriptions such as ‘the beds dip towards the dam’ or ‘if the dam is built on a syncline’. Unless such statements are accompanied or replaced by a labelled diagram it is not possible to be sure of the exact orientation of beds and structures in relation to the dam. It is also often not possible to decide whether candidates are discussing the stability of a dam or its ability to contain the reservoir water e.g. ‘the best situation is when the dam is built on a rock such as shale’, with no further qualification. Far too many candidates answered their own question of ‘All I know about the Vaiont Dam disaster’. Most discussions concentrated on water retention at the expense of the stability of the dam. Most diagrams of dams showed the valley floor as steeply inclined immediately downstream from the dam.

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Q.5 This was the least popular choice of essay.

(a) This was generally better answered than part (b) with candidates feeling more comfortable with the topic. Most candidates were aware of the nature and properties of radon; namely that it is a radioactive gas and that it is usually associated with granite bodies. Very few gave it any other affinity such as shales. The migration of the gas via permeable rocks, joints faults etc. was well understood. Some also mentioned that poor ventilation in some properties, particularly those with basements, would also add to the problem. The best accounts included the solubility of the gas in water as another possible means of transport.

(b) This part was not so well done. Candidates' discussion of bedding was nearly always confined to the possible slipping of dipping beds. Jointing was seen as a 'weakness' that might result in 'subsidence'. Cleavage was often ignored or seen as a cause of potential 'slippage'. There was usually a better attempt at the possible effects of *faulting. The depth of the water table and rockhead were sometimes completely ignored.* When discussed, the nature of the water table was understood but the possible effects on foundations were not. The best that some could offer was that the foundations would be weathered and crumble. The depth of the rockhead was better discussed but usually to the extent that the depth of the foundations would vary.

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