WJEC
CBAC

GCE EXAMINERS' REPORTS

GEOLOGY
AS/Advanced

JANUARY 2010

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.

GEOLOGY

General Certificate of Education

January 2010

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	412	60	28.2

Grade Ranges

A	40
B	35
C	31
D	27
E	23

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

GL1 January 2010

As usual, the GL1 examination was designed to test a wide range of skills including the interpretation of diagrams, graphs, geological cross-sections and block diagrams. 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.

Question 1

(a) Most students correctly identified Feature D as a suture line and the majority also identified A as an ammonite. The idea of a simple suture line was conveyed by a range of illustrations in the box provided in part (iii).

(b) Most candidates used the mineral data sheet to correctly note that Cephalopod B was preserved in pyrite and the concepts of replacement and pyritisation were noted.

(c) Most candidates commented that zone fossils were involved in dating, although the idea of relative dating was less commonly mentioned. The fact that zone fossils should be easily identifiable was correctly interpreted as True in Table 1 by virtually all candidates, although fewer indicated that the value of rapid evolutionary change is so that relative dating becomes precise. It is clear that very few students understood the meaning of the word "facies", with many interpreting it as faeces.

(d) This was designed to be a testing final section of a hitherto straightforward question. Students needed to firstly note the relative age of the two fossils and from this deduce that bed A with the younger fossil must actually be the downthrow side, leading to the conclusion that the fault is therefore a reverse fault. Most students were thrown by the apparently normal movement shown merely by lithology and paid no reference to the relative ages of the fossils. The best candidates did achieve full marks on this section.

Question 2

The majority of students correctly commented on the partially molten nature of the Earth at point A. Most, but significantly not all, were able to correctly plot and join up 4 points on a graph and using the intersection of this line with the dashed line, quote an accurate depth in section (c) (i). Some students incorrectly quoted a temperature rather than a depth for their answer.

(b) (ii) Many students were correctly able to use the data to calculate the rate of temperature change by dividing 800 by 8. However, a large number of candidates did not grasp this simple concept.

(c) (ii) This was well done with lithosphere and asthenosphere being the most common answers. In section (d), the ideas of reduced rigidity and incompressibility in the partially molten asthenosphere were developed by the best candidates. Unfortunately the incorrect and confused idea of density change was commonly noted.

Question 3

(a) In previous years such a question had only had one mineral which fitted the criteria listed. In this question the properties of both barite and augite fitted the criteria. Candidates were then expected to narrow the options down to augite using their knowledge (and indeed the further indication of “rock forming” minerals on the sheet) of minerals common in such a rock. In part (ii) the texture of rock F was described correctly in terms of a crystalline, equigranular rock with a medium grain size of 1-2 mm. The weaker answers used predominantly sedimentary terminology. In section (iii) the best students noted the mafic nature of the minerals and identified the rock as dolerite. In cases where students incorrectly noted the rock as being coarse or fine in section (ii), credit was given for answers involving gabbro or basalt accordingly in part (iii).

(b) Figure 3b contained many aspects of relative dating tested in part (i) including superposition and cross cutting. Section (ii) tested candidates’ broader knowledge without the help of the stimulus from the diagram. Reference to and an explanation of a baked margin in rock H, and included fragments of H in F were pleasing answers. In section (iii) the concordant and relative young nature of rock F meant that it could only be a sill. This was a common answer although often only the concordant evidence was stated.

(c) This question was handled well by the majority who noted the sedimentary features shown within rocks G and H, and the evidence, contained within Figures 3a and 3b, of an igneous origin for rock F.

Question 4

This turned out to be a low scoring question, with many candidates unable to interpret the block diagram correctly. In question (a), the eastward and westward dip of the beds was often not perceived, and the concept of an axial plane trace appearing on the upper surface rather than front face of the diagram was poorly understood. Similarly very few students noted the North-South trend of the axial plane traces or the eastward dip of the fold axes. In section (iv) the best students recognised that the compression would cause a reverse fault and drew bed J as upthrown on the blank west side of the fault.

(b) Many students correctly identified a load/flame structure in Figure 4b and were able to explain this in terms of the impact of deposition of sand on mud-sized sediment when it was still wet and loose/unconsolidated. The interpretation of this sequence as “the right way up” because of the upward pointing flames or downward pointing lobes was commonly noted too.

(c) This was commonly correctly interpreted as a sequence that had undergone regional metamorphism although fewer candidates specifically developed the concept of recrystallisation and alignment of crystals to form cleavage planes.

GEOLOGY

General Certificate of Education

January 2010

Advanced Subsidiary/Advanced

Principal Examiner: Mr Peter Loader

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
GL3	380	50	30.8

Grade Ranges

A	36
B	31
C	27
D	23
E	19

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

GL3 January 2010

Section A

General comments

Section A proved to be variable in terms of accessibility. Question 1 proved to be very accessible and was generally well done. Many candidates obtained the full marks. Question 2 proved to be more challenging though often marks were lost because of a failure to adhere to the rubric.

Question 1

This question was very accessible and generally well done.

(a) This was generally answered well with most candidates obtaining full marks.

(b) Again this was mainly answered correctly with the mid-Wales intensity IV presenting the greatest challenge. There were a few possible answers for the isoseismal line in this area and all were accepted. Some candidates failed to answer this question which may reflect their lack of skill or the fact that they missed the question.

(c) (i) This was generally answered correctly – most opting for a lower intensity.

(ii) The mark scheme allowed for a number of correct reasons. The two most popular were varying geological conditions (rocks etc) or building standards. In spite of the rubric some opted for invalid reasons (distances or depths).

(d) (i) This area of the specification was clearly well understood though marks were lost when the explanations were vague (“rubber foundations” “stronger materials”). The main error however, was that candidates chose to “describe” rather than “explain” the steps.

(ii) Most correct answers suggested that Britain was not on a plate boundary although some incorrectly stated that there were “no major faults in Britain” without qualification. Some confused the terms “interplate” and “intraplate”.

Question 2

This question discriminated well. Though generally accessible to most, parts (b)(ii) and (c) caused candidates the most problems.

(a) The answers to this question were disappointing. The more able candidates referred to the strength of the sandstone as compared to shale and some made appropriate references to the faults. Many ignored the rubric and suggested non-geological reasons such as wind directions, shelter etc.

(b) (i) This was well answered with most opting for the direction of the wind and the waves.

(ii) The answers to this question were disappointing and often showed poor skills. Measurement of the breakwater using the scale from Point Castillo to the elbow was often outside tolerance though most were able to gain a mark by dividing their measurement by 8 (or 9 which was accepted). Those who did not read the question properly often divided by 37; representing the number of years since the building of the breakwater to the present day.

(c) (i) This proved to be very challenging for many. The term “refraction” was rarely used and many were unable to simply describe the change in direction using appropriate points of the compass. Statements such as the waves change from E-W to NE were unconvincing.

(ii) Again this part was poorly answered. Most candidates were able to score one mark by identifying a relevant process but were not able to put this into a coherent framework. Those that scored 3 marks invariably referred to the low energy in the harbour leading to deposition of sediment.

(d) This was moderately well answered. Most good examples suggested a lack of deposition, as East Bay is in the shadow of the harbour trap, and increased coastal erosion of the shale cliff. However, a significant number of candidates thought that there would be an increase in deposition.

Section B

General comments

Candidates' responses to this section were generally favourable. Question 3 was by far the most popular choice and some excellent answers were seen. Questions 4 and 5 were less popular and generated fewer excellent responses. The main failing was again that candidates did not adhere to the rubric.

Question 3

(a) The most common failing was to give detailed descriptions (usually of the Mt St. Helens eruption) rather than sticking to the rubric of the question and describing how the eruption "... resulted in loss of life and damage to property". Whilst pyroclastic flows was a popular option, with the other two in equal numbers, a small number described all three.

(i) Many seemed confused as to the differences between blasts and pyroclastic flows and it was not uncommon for the description of one to merge into the other. Lahars were frequently cited but few made it clear that they considered these as secondary effects in the context of this question. Few that chose this option gave convincing answers and there was usually wild speculation as to the extent and power of the Mount St.Helen's blast.

(ii) Equally there was wide variation in the speeds and temperatures of pyroclastic flows. Most quoted reasonable temperature figures of between 200 °C and 1000 °C, however, they were less sure of the velocities involved. Many quoted figures between 25 and 50 km hr^{-1}.

(iii) The most popular example quoted for volcanic gas hazards was Lake Nyos. Though some made errors in its geographical location, this was quite well done with the idea of "lake overturn" correctly explained by many. However, inaccuracies in the process were common with candidates claiming that carbon dioxide is "heavier", rather than "denser", than air and the terms "toxic", "poisonous" and "suffocation" were used with little understanding of their correct meaning. The mechanism causing the expulsion of gas from the crater lake was also misunderstood with some candidates referring to the gas hazard as relating to a secondary effect of an eruption of the volcano.

(b) Candidates on this question were credited according to the depth or breadth of their answers, as many chose to give a long list of possible techniques whilst others gave a detailed discussion of the use of a few. Most candidates failed to answer in relation to the "effectiveness of the methods" as required in the question. The few candidates that did answer the question directly invariably scored very highly.

Question 4

Again many candidates avoided the key wording of the question with the significance of "geological" being generally ignored in part (a). Therefore many references to planning permission, the nature and treatment of leachates, and proximity to conurbations etc were included which could gain little credit. Another key phrase, "compared with", was also often ignored with candidates tending to write generally about domestic waste, followed by a similar approach for nuclear waste. A significant number did not distinguish between parts (a) and (b).

(a) Permeability, porosity, joints and faults were generally well known in outline although detailed descriptions were usually lacking. Discussing these with relation to domestic waste was generally well done but little was added when nuclear waste was considered. Few referred to half-life or the time considerations. It was almost unanimously agreed that nuclear waste has to be buried in crystalline rocks (usually granite). Very few considered the suitability of rocks such as clays or evaporates.

(b) This question required reference to a landfill case study and, although some excellent examples were seen, they were in the minority. In many cases landfill sites are only suitable as they are engineered not to leak and so the geology beneath is sometimes irrelevant. There was often much overlap with part (a) in this section and where candidates repeated points made previously they were not credited again.

Question 5

A similar problem occurred here as with Question 4, with candidates not making a clear distinction between the "properties" in part (a) and the disaster these might cause in part (b). The term "geological" was again usually ignored.

(a) Most candidates that attempted this question referred to factors such as porosity, permeability, dip, rainfall as being important though few then went on to consider pore water pressure.

(b) Many quoted the Vaiont Dam disaster with only the higher scorers drawing convincing and accurate geological sections to illustrate their answers. There is still a misconception that the disaster was caused by the extra "weight" of rainwater in permeable rock with no reference to pore water pressure and impermeable clay bands.

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