WELSH JOINT EDUCATION COMMITTEE
CYD-BWYLLGOR ADDYSG CYMRU

General Certificate of Education **Tystysgrif Addysg Gyffredinol**

EXAMINERS' REPORTS

JANUARY 2007

AS/Advanced Geology

WJEC
CBAC

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 2007

Advanced Subsidiary/Advanced

Principal Examiner: David Evans, King George V College, Southport.

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	432	60	25.7

Grade Ranges

A	37
B	32
C	27
D	23
E	19

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

Unit GL1

This proved to be a reasonably low scoring paper, with many students making basic errors in terms of their geological understanding or exam technique.

Q.1 (a) Most candidates correctly noted the increase in temperature with depth and gave another relevant descriptive point of Figure 1a for the second mark. However, surprisingly few students recognised that the calculation should have involved a value of temperature change divided by depth and even fewer achieved the correct answer. In section iii, most candidates correctly noted that when a material is colder than its melting point it will be solid.

(b) Most candidates were able to describe the role of heating and cooling in forming convection currents but fewer noted that since the lithosphere is solid, it will only transfer heat by conduction.

(c) Most candidates recognised the partially molten state of the asthenosphere, but few specifically referred to Figure 1a by noting that the two lines converged in this zone. It was hoped that students would explain the slowing down of S waves in terms of a reduction of rigidity in this zone.

(d) This section was done poorly on the whole, with many candidates not appreciating that the centre two S waves would not be able to penetrate the core and that additional waves would need to be drawn on Figure 1c to show those which clip the outer edge of the core as they gradually refract at depth. In part iii, only the best students recognised that two of the three marks had to come from reference to Figures 1a and 1b. As specifically outlined in the question, it was expected that students would refer to the fact that in Figure 1a, at 2900 km, the Earth materials are hotter than their melting temperature and so are molten, and that in Figure 1b the velocity of S waves falls to zero at this point.

Q.2 (a) A surprisingly small number of candidates could correctly recall the only two terms of graptolite morphology within the specification. Erroneous terms included pedicle, tail, calve, locus, frills, arms and teeth, all of which must belong to an as yet undiscovered prehistoric beast! The better students correctly noted the variation in energy levels in the environments of deposition of sandstone and shale and the impact this would have on the fragile graptolite skeletons. Good students were able to speculate on the varying oxygen content of the two environments too.

(b) Most students understood the principle of superposition and also noted the fact that graptolite A is a later form than graptolite C. However for three marks, it should have been anticipated that this observation should have been justified in terms of thecal shape, stipe number and stipe arrangement. Few students recognised either load casts or flame structures, although more attempted an explanation of how they formed and correctly interpreted the structure as having been overturned.

Q.3 (a) It was disappointing that the majority of students identified the fault type as something other than the correct "reverse". Wrong answers included normal, but also San Andreas, destructive, horizontal and unconformity. Most candidates could not clearly justify why it was a reverse fault. However, part ii was better completed, with the origin of columnar joints well explained.

(b) There was limited knowledge of the term porphyritic, with many candidates offering sedimentary textural terms. Few students wrote enough to gain three marks for explaining how the texture formed. There were few candidates who correctly identified this as a basalt, with the majority not realising that the crystal size of the groundmass is the significant feature in determining that Figure 3b shows a fine grained igneous rock. Other candidates also failed to note that plagioclase and olivine are common minerals in mafic igneous rocks such as basalt.

(c) The majority of candidates were able to use the cross cutting relationship of the fault to determine that the fault is younger than the breccia. The weakest candidates simply stated that the breccia is the youngest rock, therby failing to answer the question asked. In part ii, most correctly noted that the igneous body is a sill, but only gave the concordant relationship with surrounding rocks as evidence. Some students offered evidence not seen in Figure 3a to back up their view, such as having two baked margins, for which no credit could be given. Examiners were hoping to see the best candidates notice that the un-faulted nature of the igneous body demonstrates that it is younger than the surrounding sedimentary rocks and therefore cannot be a lava flow. Very few students made use of this detail.

Q.4 (a) Most candidates noted the presence of fossils as evidence of rock D being sedimentary. There was less success in describing the texture of rock E, where merely simple observations of crystals of relatively equal size, with a size quoted, would have gained more marks than could have been awarded. Many students correctly identified rock E as marble.

(b) Very few candidates gained all 6 marks in this section. Rock D was often not identified as a limestone despite the high calcium carbonate content, which was often overlooked, and it having been previously noted as being sedimentary. The crystalline nature of rock E, also with a high calcium carbonate content should have triggered the response of a location in the metamorphic aureole in the limestone area. It was hoped that the coarse crystalline texture of rock F would be identified as that of a coarse, igneous rock from the pluton.

(c) It was anticipated that this might be a very straightforward fieldwork question, with two relatively straightforward strands to it. Many candidates correctly understood what an unconformity was, although weaker students classified dykes as unconformities. Many students also understood the meaning of included fragments, although some did not link these to age determination above and below the unconformity. A few incorrectly classified fossils in general as included fragments. There were disappointingly few students who included a scale on their fieldsketch and even fewer who quoted a real example of an unconformity. It was pleasing to see the few examples of detailed responses to this part of the paper.

GEOLOGY

General Certificate of Education

January 2007

Advanced Subsidiary/Advanced

Chief Examiner: Peter Loader, St. Bede's College, Manchester

Unit Statistics

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Unit	Entry	Max Mark	Mean Mark
GL3	420	50	28.2

Grade Ranges

A	35
B	30
C	26
D	22
E	18

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

Unit GL3

General comment

The general quality of the data response questions was good and both were accessible to weaker candidates. Full marks were achieved by students for both questions. The quality of the essays was similar to previous years with a few full marks given. However, as with the data responses, there was a greater range of marks awarded than in previous exams. Examiners noted the lack of case studies used in questions 4 and 5.

Section A

Q.1 An accessible question which allowed some candidates to score well.

(a) (i) Very well answered. By far the most popular correct responses were that pyroclastic flows are very hot or fast and ash deposits are heavy or suffocate.

(ii) Most candidates were able to contrast the hazards at the two locations but those who failed to mention both pyroclastic flows and ash at Chio were penalised.

(iii) Generally well answered. Most suggested looking at previous eruptions and the topography, though few mentioned that a chemical analysis of previous deposits would indicate the type of magma and the style of eruption.

(b) (i) A minority of candidates obtained full marks. Most were able to suggest a possible origin such as a landslide, lateral eruption or erosion by a pyroclastic flow. However, qualifying comments outlining the evidence from the figure were often insufficient to be credited. A significant number considered the valleys to be depositional rather than erosional features.

(ii) Although many candidates suggested that a tsunami might be produced, there was often no satisfactory explanation to warrant 3 marks as to how, or why a tsunami would cause devastation hundreds of kilometres away. Some were unaware of the tsunamis hazard even though they wrote about them in answer to question 3.

Q.2 Although parts of this question were done well, weaker responses related to vague answers and poor mathematical skills.

(a) (i) This proved to be more difficult than expected and many candidates found the calculation beyond them. Even the measurement at the breakwater and the simple conversion using the scale (200 m) was a problem for some, as was the difference between the two ages (33 years often given). Some candidates tried to make the calculation too difficult and a significant number were impossible to understand.

(ii) This was also poorly answered, with many candidates anticipating the question rather than answering the one set. Many candidates simply described the difference (e.g., the East Bay has eroded much more than the West Bay), without any attempt to "explain".

(b) The response to parts (i) and (ii) was generally very good.

(c) The response to this question was disappointing. Again it was common for candidates to describe the retreat rather than "explain" it. Several explanations were accepted, so long as they agreed with the evidence, though more able candidates had little difficulty suggesting how the retreat might have resulted from undercutting and landslip. Sometimes, reference was made to Figure 2c which also obtained credit. A significant number made vague statements as to the strength of the rocks with little attempt to address differences.

(d) This was very well answered as most candidates were aware of at least one way in which the erosion might be addressed. The use of gabbions and seawalls were the most popular remedies though few made reference to their fieldwork.

Section B

General comment :

Though all three essays were seen, questions 3 (particularly) and 4 were the most popular. Apart from question 3, very few case studies were referred to and, even there, the quality and relevance was variable and debateable.

Q.3 The most popular choice which also elicited the best responses.

(a) Generally well done. Most candidates quoted "Ring of Fire" and gave a satisfactory description of the reasons for the distribution in terms of plate tectonics. The average candidate simply explained the nature of the eruptions in terms of melting of oceanic lithosphere and the rising magma being viscous. Many candidates still claim that friction between colliding plates causes melting and some considered Hawaiian volcanicity. This was acceptable for comparison purposes in discussing the effects of magma viscosity on the type of eruption, though some suggested the Hawaiian Islands are situated at a destructive plate boundary and are generally explosive.

A few candidates impressed with discussion of subducted sediment and sea-water; partial melting; formation of andesitic and rhyolitic magmas; gas content; slow rise and blocking of vents. Some even went beyond the AS specification to mention lowering of melting points; differentiation; and contamination.

(b) Some excellent responses included convincing arguments as to how fires are hazards common to both earthquakes and volcanoes. Tsunamis were well covered as was damage to buildings. Weaker candidates failed to answer the question set. They ignored the fact that the question asked for similarities and wrote in general terms about earthquakes and volcanoes with regurgitated case studies and little or no attempt to compare the two. Generally, the second part of the question (management) was better addressed.

Q.4 The second most popular essay and generally not answered with case studies.

(a) (i) Some very disappointing responses, where candidates could only discuss this in very general terms. Many vague and imprecise accounts could be essentially reduced to "leachate is produced from rotting waste and it soaks into the ground to pollute the groundwater." It was a minority who gave satisfactory consideration to the porosity and permeability of the underlying rocks. A significant number included considerations better reserved for part (b).

(ii) There were very few satisfactory accounts of pollution resulting from mining. A significant number of candidates suggested that oil from machinery was the major problem and were vague on acidic mine water with few mentioning case studies. However, there were a few excellent accounts that even explained the chemistry.

(b) This was much better done and most candidates scored well. Reference to plastic and clay liners was common, often in some detail, though without reference to specific examples. Some, however, wrote extensively about recycling waste and avoided geological considerations altogether. Generally, the very few who chose to consider mining activities were weaker.

Q.5 The least popular essay with an absence of case studies.

(a) (i) A disappointing response. Most accounts were in very general terms and the insufficient use of well-labelled diagrams was evident. A significant proportion of candidates brought ground water into their discussions.

(ii) Few chose this option and few were convincing.

(iii) Though the responses here were generally better, with consideration of subsidence more common, the role of pore fluid pressure was rarely explained in all but general terms.

(b) Not well done. Apart from the few good accounts which considered surveying etc., many considered ways of preventing instability rather than monitoring it.

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