GENERAL CERTIFICATE OF EDUCATION
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EXAMINERS' REPORTS

GEOLOGY (LEGACY)
AS/Advanced

January 2009

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 (Legacy)

General Certificate of Education

January 2009

Advanced Subsidiary/Advanced

Principal Examiner: 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	312	60	34.6

Grade Ranges

A	44
B	39
C	34
D	29
E	25

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

GL1 (Legacy)

The GL1 Examination was designed to test a wide range of skills including the interpretation of diagrams, graphs and geological cross-sections. The paper covered a broad selection of the specification content and included both straightforward and more complex ideas, making it appropriate for a wide ability range.

Q.1 (a) Many students correctly identified both body parts, although teeth were more commonly misidentified as the thecae on the graptolite or the crenulations on the margin of the bivalve.

(b) The sedimentary structure was identified as ripples by the majority of students and the symmetrical nature of the ripples was the key to gaining full marks in part (ii) where the description of the two-way movement of water was essential to gain full marks. In section (iii) credit was given to most candidates who noted the importance of hard parts in the bivalve and the implications for preservation.

(c) Most candidates correctly identified the desiccation cracks in Figure 1c and the best noted their formation due to contraction of a fine-grained sediment upon drying out.

(d) The “fieldwork” question followed the format of previous years and the high standard of responses was very encouraging, with attention paid to scale, detail of description and precise location for field examples.

Q.2 Whilst it is recognised that it is preferable to have questions and diagrams on the same pages, the marks for this question were high and suggest that candidates were not disadvantaged by the layout of the question. In addition there were very few candidates who failed to complete the paper, suggesting that the layout of question 2 did not significantly slow candidates down.

(a) In this section, students were led through the stages of the calculation and consequently it was completed accurately by the majority. However there were a surprising minority who did not know how to calculate velocity. In part (ii) many students noted the deeper path taken by S-waves arriving at station B and consequently their path through more rigid material.

(b) Most candidates successfully read off the S-wave travel time on Figure 2c and used the graph to determine the distance. A few candidates incorrectly chose to use the arrival time of the surface wave. In part (ii) students should have used the calculated distance for seismic recorder C and the arrival time for the P-wave in Figure 2c to plot a point on Figure 2a. The best students then drew a curving P wave line through this point on Figure 2a. The line was well drawn by most candidates.

(c) The majority of candidates noted the absence of S-waves on Figure 2d, together with the longer arrival time of P and surface waves and the lower amplitude of the waves on seismogram D. In part (ii) these differences were explained well by most in terms of the liquid nature of the outer core, and the greater distance of seismogram D from the epicentre. A few candidates both described and explained in c(i), and did not repeat their explanations in c(ii). Consequently no credit could be given for explanations in c(i) despite the fact that students knew the answers. Care should be taken to answer the question set in each section.

Q.3 (a) Surprisingly only about half of the candidates correctly identified the fault as a reverse fault and many failed to use the included fragment information to note the conglomerate as the youngest rock.

(b) The majority of candidates correctly named basalt in section (i) and noted the rapid cooling on contact with water as the origin of the fine grained rim.

(c) Many candidates linked the origin of vesicles to gas bubbles trapped during the cooling process. In section (ii) the vesicles were correctly described as being distributed close to the edge of the pillow structures, and some candidates mentioned the fact that they had risen to get there. Very few however noticed that the reason the vesicles were close to the base of the structures in Figure 3b was due to the inverted nature of the rocks in this region.

Q.4 (a) Many candidates used igneous terminology incorrectly in a metamorphic rock. Some candidates stated the size of the block of rock in Figure 4 for which no marks were generated. The best answers quoted the size of the chiastolite crystals, noted their random orientation and observed that the rock is actually fine-grained.

(b) Candidates were expected to simply note that this was formed by contact metamorphism of a fine grained sedimentary rock by heat from an igneous intrusion. Few students gained full marks, with a significant number commenting incorrectly on the effects of heat and pressure.

(c) Most students correctly named a mineral in schist and noted the foliation/schistocity in schist. Fewer candidates recalled that a schist is coarser than rock P. In part (iii) it was pleasing to see that candidates recognised the role of regional metamorphism in the formation of schist rather than the contact metamorphism forming rock P.

GEOLOGY (Legacy)

General Certificate of Education

January 2009

Advanced Subsidiary/Advanced

Principal Examiner: Peter Loader

Unit Statistics

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Unit	Entry	Max Mark	Mean Mark
GL3	191	50	29.5

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.

GL3 (Legacy)

Section A

General:

Section A proved to be equally accessible to most candidates taking either the new specification or old (legacy) papers. Both papers shared data questions 1 and 2 because of the similarity in assessment objectives.

Q.1 This question was very accessible and generally well done.

(a) Well answered. The most popular correct responses were lahars and flooding though other valid alternatives were credited.

(b) (i) Most candidates gave an acceptable answer with only a small minority ignoring the instruction "above its background level."
(ii) The vast majority answered this correctly.

(c) This caused few problems, although a few gave an acceptable source (magma or gas) but could not elaborate. There were many references to "**lava** (moving) underground (here and in e).

(d) Most scored at least one mark but some found it difficult to explain. Vague examples such as *the temperature changes are not reliable* gained little credit. The candidates who obtained the marks most readily were those who quoted data from the figures. A suitable example being *although there was a rise of 12°C for the 1965 eruption it was only 6°C in 1966 and 4°C in 1967. Also there is data missing in 1965 and 1966 so we cannot see the full pattern.*

(e) Overall this was well done but many, having given a correct method, failed to adequately explain their answers. Candidates should be wary of making statements that are open to interpretation. For example, *there is an increase in the frequency of earthquakes just before an eruption*.

Q.2 An accessible question with part (c) causing the most problems**.**

(a) This was well done though even more able candidates estimates were sometimes out of tolerance.

(b) Generally well done. The most common correct response was *voids (spaces) are left behind and the weight of the rock above causes collapse*. However, many just gave vague reference to just one factor - such as *empty space is left when the seams are removed* or *the weight of the rock on top is too much*.

(c) This question discriminated well. The question clearly asked candidates to "assess" the effects of three factors that might account for the difference in subsidence of the two mines. Despite the data provided, a number considered the depth of the **shallowest** seam. Those that considered the effect of the superficial deposits, water table, or depth to the deepest worked seam were unlikely to gain credit in their explanation. Weaker candidates even assessed 'total surface subsidence' to be a factor!

(d) Acid mine drainage was very popular and there were some excellent descriptions. This is obviously very well understood by the majority of candidates. Responses that cited subsidence gained no credit.

Section B

General:

The majority of candidates selected to answer question 5 which was relatively poorly done. There is still a reluctance of candidates to make use of well labelled diagrams.

Q.3 (a) The more able candidates produced some good responses that concentrated on detailed descriptions of porosity and permeability. It is commonly assumed that the larger the grain size, the greater the porosity. Candidates do not seem to appreciate that a large number of small spaces can produce a higher porosity than a smaller number of larger spaces. The effect or sorting, shape, packing or cementation was rarely mentioned by weaker candidates as factors to affect the storage of groundwater. Specific retention was not mentioned at all. Credit was given to discussions of structures (artesian basins, confined/unconfined aquifers) if related to permeability. Unfortunately many ignored the rubric and produced generalised descriptions of aquifers and the uses to which the water might be put.

(b) Again, far too many generalised discussions concentrating on the problems of water shortages rather than geologically related hazards. Attempts to describe saline incursion were weak. Although most candidates referred to cones of exhaustion, attempts to show them diagrammatically were of a low standard as were the relationship of the saline interface with freshwater. Saline incursion was not clearly understood.

Q.4 Not a popular choice and most were of a poor standard.

(a) (i) Very few attempted this and understanding was poor.
(ii) Popular but most candidates could make very few valid observations. Most accounts, in effect, just stated that geological maps show the rocks in the area.
(iii) Not popular and attempts were very superficial.
(iv) Popular but details were lacking. Soil sampling in particular was poorly understood.

(b) Accounts tended to be very superficial. Several candidates were most concerned to establish that the area was no longer experiencing igneous activity. Hardly any candidates referred to any need to monitor radon levels. Similarly, the importance of jointing in granites was generally not appreciated. Some candidates failed even to refer to granite and gave generalised explanations of the problems of dam construction.

Q.5 This was by far the most popular choice. There were excellent discussions, unfortunately overshadowed by the tendency of most candidates to describe the socio-economic considerations at the expense of the geological.

(a) Too many descriptions of the devastation and not WHY it occurred. Geographical answers relating to the resulting aftermath of the devastation were frequent and geological accounting could be summed up as *big wave hits and the flooding destroys things*. It was regularly claimed that the velocity (and/or energy) of tsunamis increases as it moves away from its source AND as it enters shallow water. More able candidates exhibited a sound understanding of the energy, wavelength, amplitude and velocity considerations applied to tsunamis. Hardly any candidates noted that the speed of a tsunami is related to water depth, or that more than one wave is involved and it is later waves that usually cause the most damage. Most quoted the SE Asia (Boxing Day 2004) tsunamis with various degrees of accuracy.

(b) 1. Tsunamis : some good descriptions, although these generally related to socio-economic considerations such as the effects on fishing, tourism, disruption of communications, relief aid etc.
2. Mass movement : some excellent accounts covering a wide range of precautionary techniques. There was some trade off between depth and breadth but there was a significant number of candidates who produced detailed lists but did not give sufficient detail to warrant the highest marks. Few real case studies were quoted but those who did were rewarded with the highest marks.

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