WJEC
CBAC

GCE EXAMINERS' REPORTS

GEOLOGY (Legacy)
AS/Advanced

SUMMER 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

General Certificate of Education 2009

Advanced Subsidiary/Advanced

GL1 Foundation Geology

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	178	60	39.4

Grade Ranges

A	47
B	41
C	35
D	30
E	25

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

GL1

General Comments

The paper seems to have been generally well received, with many candidates achieving a pleasing standard of marks. There were many opportunities for candidates to display a wide range of knowledge.

Q.1 This proved to be quite a high scoring question with many candidates showing sound knowledge of issues related to Plate Tectonics.

(a) This was a straightforward introductory question. The three arrows were correctly drawn by virtually all of the candidates.

(b) A number of candidates marked D and S on the map Figure 1a, rather than on Figure 1b and so carelessly lost marks.

D was credited either within the descending lithospheric slab, or at depth within the continental lithosphere. S was only credited within the lithosphere between the margins of the rift valley.

(iii) The majority of answers correctly linked deep focus earthquakes to friction and release of stress at depth within the subducting plate.

(c) Most students correctly identified the age order.

(d) It was common for students to give precise, detailed responses concerning the formation of pillow lavas by rapid cooling during eruption into water. Fewer students were able to recall the origin of basaltic magma caused by partial melting of the mantle.

Q.2 This too proved to be a high scoring question.

(a) (i) The majority of students correctly identified the trilobite and the glabella was also well known.

(b) Was often well answered.

(c) Was invariably answered correctly, explaining the difficulties of preserving soft tissues.

(d) The loss of mineral calcite by acidic pore-waters was often ignored, although its replacement by quartz was a common aspect of the answer.

(e) Was competently undertaken, although only the best students could explain why conditions such as energy levels may have changed. The most common explanation being the decline in energy level related to a rise in sea level. However other creditable explanations related to turbidity currents or storm events were received.

Q.3 (a) Most students correctly identified clast H in question (a) as a basalt or pumice and were able to explain the origin of the vesicles in the clast due to gas trapped during the cooling of the magma.

(b) Virtually all students noted the fold as an antiform/anticline

(c) (i) The rock as a breccia. Conglomerate was also accepted due to the rounded clast shapes in the shading on Figure 3a.

Q.3 (c) (ii) Most candidates noted that poor sorting or angular clasts would suggest a short transport distance. Fewer candidates suggested that only the large size of the clasts would indicate the fast flowing nature of the river. The eroded base of a channel was the only clear evidence of a river and this was picked up by many but not most of the students.

(d) Was well answered.

(i) Many candidates correctly applied the principle of superposition.

(ii) Law of included fragments. Only the best candidates realised that there is no link between the greywacke and the rock of clast H, and so the relative age of the two cannot be determined.

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 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) As in previous years, this style of question was answered with a mixed response. The best answers included a quality scaled diagram of a relevant sedimentary structure, with a brief written description, and a written explanation of how it can be used to indicate a former current direction. Many good answers added a field location for such features, for which credit was given although this was not necessary to gain full marks.

Common errors included a lack of detail about how the current direction could be determined and asymmetrical ripple marks with overturned down-current faces. Excessively steep current bedding was another popular mistake. Other errors included sedimentary structures such as graded bedding which cannot be used to show a former direction of current.

GEOLOGY

General Certificate of Education 2009

Advanced Subsidiary/Advanced

GL2a Investigative Geology

Principal Moderator: Mr. Craig Well

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
GL2a	263	60	39.6

Grade Ranges

A	44
B	39
C	34
D	29
E	24

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

GL2a

The paper tested the range of skills and techniques flagged up in Unit GL1 of the specification. The demands made by the paper on candidates were designed to be broadly comparable with previous years, but an increase in the mean mark compared to previous years suggested that it was more accessible, especially Question 5. This was not unexpected as the vast majority of candidates were re-sitters in their second year of study. Differentiation, however, was still achieved.

Q.1 (a) Many candidates accurately read the question stems and so were able to structure their answers to gain maximum credit. A few, however, attempted to suggest reasons why Rock Unit F in Photograph 1 was the intrusion with others suggesting that Rock Unit A was an extrusion.

(ii) A description of "crystalline" alone was not credited as this is applicable to both extrusive and intrusive rocks. The coarse crystals in Specimen A and the fact that Locality II on Map 1 was not within a chilled margin usually allowed candidates to correctly argue that the texture resulted from a slow cooling rate typical of a large intrusion. Credit was also given to candidates who identified the specimen as granite and then gave the explanation that these rocks typically form in intrusions.

(b) (i) Most candidates linked the change in trend of Rock Unit a with the fault at Locality III.

(ii) Not all were able to correctly argue the relative ages – a study of Map 1 clearly shows that the main outcrop of the intrusion cuts the fault and is therefore younger.

(c) It was pleasing to note that almost all candidates followed the rubric and only ticked three boxes (the mark scheme penalised those who tick more). K to L is a transect from shale into an aureole and therefore tested the textural changes brought about by contact metamorphism, but the responses were disappointing with relatively few candidates gaining full marks.

Q.2 (a) Required a description of the test (not just a name) and a result which could have been obtained by the specified equipment. This is testing the ability to plan and implement. The mineral data sheet indicates that hardness is a useful property for diagnosis of gypsum and this was compulsory; many other tests were described and credited but not that for cleavage given that the specimens were fibrous aggregates. A negative test for acid was originally not going to be credited, but as many candidates had used this to eliminate calcite, the examiners' conference, held after a selection of scripts had been viewed, decided that this was acceptable. A very small number of candidates obviously used Specimen D red sandstone) here and this may have been a consequence of the changes brought about by WJEC in that it didn't have the specimens pre-labelled but asked centres to identify them to candidates. Feedback from centres suggested that some were placed in labelled boxes and others linked them to a centre produced sheet of photographs. Centre staff are asked to examine the specimens on arrival and so photographs are allowed, but these must be given the same security as the specimens and papers until the test is taken.

(b) Was poorly answered. Transect M to N on Map 1 is a measurement of the width of outcrop while Figure 1 is the true thickness of the rock unit; many candidates stated "depth" (i.e. as in a borehole) but this wasn't credited. If Specimen D was examined using a hand lens then answers addressing the size (a medium to medium-fine sandstone), shape (majority are rounded) and the nature of the contact between grains (not interlocking, with pores) gained full credit provided the scale on Figure 2 was correctly utilised. Drawings of fibrous gypsum were sometimes seen – the problem mentioned previously or just carelessness by candidates who didn't appreciate the change in letter in the stem?

(d) Required a correct evaluation and evidence for the mark for each rock unit. All were deposited in *"a desert environment by fluvial and/or aeolian processes"*. Photograph 2 showed desiccation cracks and Figure 1 indicated a fine textured sediment. Candidates who appreciated this usually correctly stated false with an adequate explanation of why Rock Unit C wasn't aeolian. Gypsum (Specimen C) is also an evaporate mineral. Photograph 4 and Figure 1 gave information that it was too coarse to have been transported and deposited by wind – a fact realized by many candidates. Glacial origins for Rock Unit E were not credited. Photograph 3 (cross-bedding), Figure 1 and Specimen D allowed candidates to argue that it could have been an aeolian dune, but equally, those from centres who have examined red beds in the field suggested a fluvial origin. Both routes gained credit!

Q.3 (a) Some candidates penalized themselves by drawing the whole of Photograph 5 rather than just the circled area. Some excellent drawings were seen, but careless observation e.g. in the number or shape of thecae reduced the total awarded in most cases.

(ii) "Graptolite" was almost always the answer, but some candidates went further by identifying the fossil as "*Didymograptus*" – impressive answers for only 1 mark!

(b) Allowed both preservation and environmental statements to be credited.

Q.4 (a) (i) Although most candidates were able to correctly identify the rock units, they were often less successful in determining their relative ages, which are clearly indicated by dip symbols on Maps 1 and 2. Fault F1 has a reverse movement, but where candidates had incorrectly stated that Rock Unit B was the younger, a normal movement was credited if arrows were drawn to indicate this. This is to avoid a double penalty to the candidate for getting a previous part of the question wrong. It is also hoped that candidates realize that the younger beds go down in dip-slip movements!

(ii) A surprising number got this wrong.

(b) (i) Required that candidates draw axial plane traces across the surface outcrop. It was argued, and accepted, at the examiners' conference that the use of the word "either" in the stem could have been interpreted as being only on one side of the fault. As usual, however, the award of full marks was only given for accuracy in position, length and labelling of the APT.

(ii) Saw many candidates mistakenly taking the direction of dip of the limb as the fold trend.

(c) (i) Many correct answers were seen

(ii)&(iii) Not all were as successful as in (i). The movement was to the right but even if this gained credit, candidates then had difficulty in giving evidence. The displacement of one bed is not conclusive, as dip-slip faults also have this effect. Answers which mentioned offset of the fold axis or fold limbs were the commonest to gain credit.

Q.5 (a) The very flexible mark scheme traditionally used in questions of the type in part (a) continues to allow credit to be given for any good interpretation of the information given on Map 1. There are some centres who obviously spend considerable time and effort on map work and here candidates' scores on this question are of a much higher standard than the rest of their responses within the paper, as well of other centres.

(b) The geological history was partially completed this year and was subsequently reduced in weighting, but it still achieved a wide range of responses.

GEOLOGY

General Certificate of Education 2009

Advanced Subsidiary/Advanced

GL2b Investigative Assessment

Principal Moderator: Dr. Alan Seago

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
GL2b	32	60	47.5

Grade Ranges

A	44
B	39
C	34
D	29
E	24

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

GL2b

Twenty three centres submitted field investigations for moderation. A small minority of centres entered candidates for the Legacy specification. It is pleasing to report that centres are taking note of comments made in individual centre reports in previous years so that there is a continuing improvement in the suitability of tasks being undertaken and the quality of candidates' work. There has been a vast reduction in the number of centres where scaling is required and the amount of scaling that has to be applied. There are two main reasons why scaling has to be applied:

- reliable rank order but marks generous or severe
- failure to show how criteria have been achieved by annotation of candidates' work.

Centres are not now creating difficulties for themselves and for the moderators by submitting field investigations from outside the context of GL1 skills. Centres should be aware of the required context of the investigation at all times as described in the specifications.

The centres are to be congratulated on:

- the standard of work produced by the candidates
- the opportunities given to the candidates to study geology in such suitable areas
- and in most cases the accuracy of the assessment.

The enthusiasm for geology and expertise of the teaching staff in centres is obvious from the quality and effort put into coursework submissions.

There were one of two examples of errors in administration particularly by new centres such as using the incorrect forms, not doubling the marks to a mark of 60, discrepancies between marks on the work and on the forms and not authenticating the work of the candidates.

The better investigations include the demonstration of basic field skills such as rock identification and textures, identification of field structures using dip and strike/field sketches, sedimentary logging and fossil identification. The data collected can be manipulated and presented in cartographical or graphical form. Some excellent field investigations are now being seen which are well suited to the assessment framework. It is good to see geological field skills being demonstrated with a high degree of competence. There were, however, a minority of investigations which would have been more suited to GCSE lacking, as they did, any scope for advanced analytical skills and any degree of complexity. It was disappointing to see the 'building stones' investigation appear once again after a welcome absence for a number of years now. The basic field skills of measuring dip and strike, drawing field sketches of geological features, constructing logs and mapping of relatively straightforward structures cannot be demonstrated in this investigation. Moderators, whilst appreciating that large numbers may be difficult to accommodate, would hope to see candidates given greater opportunity to demonstrate a wider range of geological skills, particularly if suitable geological locations ware within easy reach of the centre.

In some cases there was no risk assessment although the number of instances is decreasing. It was pleasing to see the extensive use of the Planning Tracking sheet. Some thought has to be given at the planning stage as to whether the data being collected is suitable for processing and analysis e.g. histograms, cross-sections, logs, rose diagrams, maps and geological histories. A number of centres are now making preliminary visits to sites in order to allow some forward planning by candidates, which often results in better Planning marks. Some candidates devoted insufficient time on the retrieval and evaluation of relevant material from different sources.

Some field notes consisted entirely of tables of data and it would be an improvement to see a variety of data collection including field sketches and rock descriptions etc. In a number of cases, opportunities for the collection of basic field data have been missed. Observations such as rock identification, grain size, sorting, direction of cross-bedding, clast roundness/ orientation, field sketches, dip and strike measurements should normally be part of every investigation where appropriate. There is no need for candidates to repeat observations made in the field notebook within a report unless it contributes significantly to the analysis. It is more advantageous for candidates to concentrate their efforts on the analysis and evaluation. In a minority of cases it was difficult to distinguish between field data and secondary data or individual work and collective work. Centres and candidates should ensure that nature of the work is clearly identified for moderation. Candidates are making good use of their IT skills.

A mixture of tasks was undertaken, with a rough break down being investigations into:

- interpretation of sedimentary environments (sedimentary logs, fossils and rock description)
- mapping exercises (leading to drawing up of geological sections and history)
- analysis of fossil assemblages
- joint orientation related to faulting (rose diagrams and stereonets)
- structural analysis (faulting and folding styles related to compression or tension or to specific orogenies)
- textures of Quaternary coarse grained sediment
- nature and relative age of igneous intrusions
- evidence for contact metamorphism around a granite intrusion.

Centres should be congratulated on the variety of opportunities given to candidates in areas of outstanding geology such as, North Wales, Isle of Arran, Pembrokeshire, Ogmore, Yorkshire coast, Alderley Edge, Gower Peninsula, Dorset, Black Mountain, Lake District, Devon and Cornwall. Other centres made good use of suitable local geological locations.

Centres should be aware that there is help available from WJEC. Published exemplars of coursework investigations can be obtained from WJEC offices and INSET activities are provided. Moderators' reports on the current moderation process are sent out to centres. Centres are urged to act on any recommendations in the Moderators Reports. The Moderators do not enjoy moderating work which achieves low marks as this is going to be disappointing for the centre and the candidates, especially when there is often so much suitable geology on the centre's doorstep which with a little help and guidance can result in a successful submission. There are guidelines in the specification such as Planning Aid p62 and suggested investigations p22.

Alternatively the centre could discuss suitable investigations with me through e-mail/ telephone as several centres do. This can include advice on the suitability of coursework investigations prior to carrying them out and examination of candidate's draft field investigations. Any centre having a problem with applying the assessment framework should contact WJEC well in advance of the submission date. If a centre requires further clarification of the Moderator's Report or assistance with future presentations please contact me at the following e-mail address as345@tutor.open.ac.uk.

GEOLOGY

General Certificate of Education 2009

Advanced Subsidiary/Advanced

GL3 Geology and the Human Environment

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	65	50	30.5

Grade Ranges

A	35
B	31
C	27
D	23
E	23

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

GL3

68 candidates opted for this paper.

Mis-spelling continues to be a significant problem as is the clarity of some writing.

Section A

Q.1 (a) Generally well done although many did not use the terms from Figure 1. “Ash cloud” was a common choice.

(b) This caused few problems so long as candidates addressed the question. Many gave details that were not relevant such as “a lahar is formed when melt water mixes with ash to form a river of mud” rather than discussing how lahars cause loss of life and damage buildings.

(c) Again, generally well done but some candidates did not stick with the rubric and preferred to describe eruptions rather than the hazard management. The highest scoring answers were invariably related to lavas. There were some over-optimistic claims as to the ability to manage pyroclastic flows and lateral blasts. In both cases the design of buildings was stated as being an effective way to manage the hazards.

Q.2 (a) (i) Caused few problems.

(ii) Well done apart from some candidates who ignored the instruction to “describe” as well as “explain.”

(b) A and B were equally popular and well covered. The responses to B tended to be better than those for A. Some claimed that there had been less mining at A. Several candidates likened the contorted shale to flame structures. These tended to be high scoring candidates.

(c) Many described just one hazard which limited their marks. At least two were required for full marks. Some of the descriptions were very superficial and more or less amounted to a list. There were some excellent accounts of acid mine drainage. A significant number ignored the rubric and accounted for ground subsidence.

Section B

The overall standard of essay was disappointing. Most candidates were aware of the basics but were unable to progress beyond that into any detailed discussion of the factors involved.

Q.3 (a) Generally well done. Most candidates were able to adequately describe the Richter and Mercalli Scales although a small number confused which one gave a measure of intensity and which one magnitude. These candidates were not greatly penalised so long as the discussion was of a high standard.

A very small number were obviously acquainted with the the MMS scale but no one was able to convincingly describe its use.

At this level the Richter Scale is taken to measure the energy released while the Mercalli measures the damage caused. It is a very widespread view that intensity cannot be measured in an area where there are no people at the time of the quake.

Many stated that either one or both scales were from 1 to 10.

(b) All options were popular although seismic activity was the most common and earthquake lights the least. There were some very good accounts of all four. Many chose to describe the use of seismic activity and radon gas to predict volcanic eruptions.

Q.4 (a) Diagrams were quite well used and the labelling was particularly encouraging. Accounts tended to be rather superficial. The better candidates discussed porosity and permeability but any consideration of pore pressure was generally lacking.

(b) This was done much better. A few lost marks by just making a comprehensive list without significant explanation. All of the engineering techniques were covered and well understood.

Q.5 Very few attempted this question.

(a) Answers were not well organised. The comparison asked for was rarely adequately addressed and straightforward descriptions of waste-disposal were the order of the day. It was disappointing that the half-lives of isotopes was rarely considered.

(b) Again, not well answered. In some the particular site was not identified. Answers tended to be very superficial involving much overlap with (a).

GEOLOGY

General Certificate of Education 2009

Advanced

GL4 Interpreting the Geological Record

Team Leader: Miss Jo Conway

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
GL4	932	96	52.2

Grade Ranges

A	64
B	56
C	49
D	42
E	35

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

Although the mean has dropped by 10 this year, the candidates accessed a wider spread of the marks seen by an increased standard deviation. This year has also seen an increase in male candidates taking the subject showing a slight shift in gender proportions.

Questions certainly discriminated between candidates, and a wide range of marks were seen.

Section A assessed areas which candidates usually find very challenging, in depth knowledge on igneous rocks in Q1 and metamorphic rocks in Q4. Q3 similarly challenged the candidates with rock deformation. Section B again showed a trend of improvement and more familiarity of the candidates with the map work style assessment than in previous years.

Section A

Q.1 The question focussed on a phase diagram for olivine crystallisation, and assessed a similar part of the specification to last years Q.1.

Candidates scored well on this question, with candidates demonstrating good levels of knowledge.

(a) Majority of candidates got this correct.

(b) The majority of candidates completed the table with no problems, however some candidates left some boxes blank.

(c) (i) In this part of the question, the examiners were testing for both an evidence and explanation. Many candidates simply listed factors, e.g concordant and did not get the full credit for the answer, as they did not explain that this meant it was not a dyke. Many candidates discussed a chilled upper margin, which was not credited since lava flows would experience chilling on the upper surface. Good candidates gave good accounts using baked margins. Examiners did not credit the use of the word horizontal as an alternative to concordant.

(ii) Candidates generally got 3 marks on 1 for olivine crystallising out first, being more dense and sinking. On 2, candidates gave good accounts for the xenoliths. Many candidates found 3 tougher, but good answers talked of the early formed Mg rich olivine being in the chilled margin which has instantly cooled (preserving the original magma composition) and leaving no time for the early formed crystals to react back with the melt.

Q.2 The question examined the fossil part of the specification. It was well answered and differentiated well amongst the candidates.

(a) (i) It was disappointing that after two years studying geology, many candidates incorrectly identified the species as brachiopods, or decided the species were not from the same fossil group and gave more than one answer.

(ii) Majority of candidates were able to give good descriptions of morphological differences between the species. However, in some cases poor spelling gave some confusion, candidates obviously wanted to refer to the ribs on species A and call it ridged, but their spelling resulted in rigid which gave a different slant to their answer, and a small number of candidates confused pallial sinus with suture line.

(iii) Good answers were seen for the modes of life, candidates explaining the rough shell of A were for high energy environments and it was a surface plougher, and B was a burrower due to the large pallial sinus. Incorrectly a small number of candidates explained that B had a swimming mode of life.

(b) (i) There were some strange plots of species A (eg. L 3mm W 3mm) but generally candidates completed this part with ease.

(ii) Again the examiners were testing the candidate's ability to describe AND explain the data distribution. Good answers described positive correlation and that it could be explained by a life assemblage of a range of ages. Some candidates were confused and thought the question related to evolution and discussed gradualism.

(iii) This last part of the question looked at the higher level skill of evaluating the evidence, and candidates were given a statement and asked to evaluate it with the evidence they were given. This was often done well, with candidates agreeing with the statement substantiating it with evidence of clustered data, original mode of life as a burrower but shells now found on a beach indicating transport, and the chipped but not broken shells.

Q.3 This question examined the rock deformation part of the specification and brought in way up structures. Candidates found this a challenging question.

(a) (i) Many candidates struggled to mark the axial planar cleavage of the diagram.

(ii) Majority of candidates were able to describe the fold as asymmetric (using the description given) and give the interlimb angle of 65°

(b) (i) The photograph was clear and the majority of candidates correctly identified sedimentary structure R (sole structure), although a common incorrect answer was slickensides.

(ii) Many candidates had difficulty in working out the way up of structure R, the sandstone loading on the shales.

(iii) Good answers referred to way up structures as evidence for the incorrect way up linking to the oldest rocks being in the centre, and the shape of the fold.

(c) (i) Many candidates got full credit for drawing vertical lines on the fault plane.

(ii) However it seemed some candidates had guessed their correct answer in (i) when taken in conjunction with their explanation. Many candidates incorrectly identified the fault as being a strike slip fault for which there was a limited amount of credit given. Good answers included vertical bed has not been offset, but the dipping beds and axial planes have, and that it could be explained only by vertical movement.

(iii) Majority of candidates scored highly, evaluating last movement only and fault reactivation and giving detailed knowledge of smooth slickenside in direction of movement. A small minority of candidates confused slickensides with glacial striations.

Q.4 The question examined metamorphic rocks. Although candidates found the question challenging the question differentiated and candidates demonstrated the whole range of marks available.

(a) (i) Candidates described rounded grains, moderate sorting and used the scale to give grain sizes. Many candidates also made reference to crystalline cement which was credited.

(ii) Examiners marked the texture diagram holistically, and were looking for an interlocking crystalline texture which was drawn to scale. Good answers showed 'ghost' ooliths. Unfortunately there was little space around the diagram for candidates to write their labels.

(b) Common correct answers were 200°C because below this temperature there was not enough energy for recystallisation to occur. A common incorrect answer was 620°C.

(c) (i)&(ii) Majority of candidates gained all 3 marks.

(iii) Examiners were looking to credit good science here, and many candidates scored well. Good answers included water allowing faster transport of the heat by convection, and hence leaving little time for metamorphic changes.

(d) Majority of candidates gave very full answers to describe a range of factors. Commonly temperature/size/time since the intrusion, angle of contact with the country rock and nature of the country rock. Surface area to volume ratio of the pluton was also credited.

Section B

The 1:50,000 solid and drift map extract of Monmouth was clearly reproduced, accompanied by a cross section.

Q.5 This question was generally well done, with many candidates scoring highly.

(a) Well answered.

(b) The majority of candidates gained full credit here selecting a suitable grid square which showed angular unconformity.

(c) (i) majority of candidates correctly identified 20°, and Rockey as the youngest and Brazilly as the oldest.

(ii) Majority of candidates explained the rocks were dipping eastwards in a valley for the 'v-shaped' pattern.

(d) (i)&(ii) Majority of candidates were correct.

(iii) Candidates provided very good fully reasoned answers to this part of the question. Some candidates lost some credit by not noting there were 4 marks for this part of the question and an explained reason was required. Excellent answers showed the candidates using the map, e.g. the width of outcrop 2 is lower as it is dipping more steeply than outcrop 1, and Outcrop 1 is affected by the Cannop Fault Belt revealing more of the sequence than the unfaulted outcrop 2.

Q.6 This question differentiated well, although some candidates left some parts unattempted.

(a) (i) Majority of candidates were able to draw the correct symbol for a syncline on and arrows to show a northward plunge.

(ii) A good number of candidates showed both folds plunging to the north. Some candidates hedged their bets with the plunge and drew plunges in opposite directions.

(b) The Examining Team apologises that the cross section shows X-X in Figure 6b, although the candidates did not appear to have noticed this small error or to have been affected by it. Good answers showed (from the left) an anticline, a syncline which was terminated by the unconformity.

(c) Again this question asked candidates to explain the evidence. Many candidates simply repeated the question stem 'there are 2 phases of folding' which was not explaining the evidence. Good answers were seen which talked about the different angles of folding and the local unconformity between them, and explained the principal stresses by the axial planes having the same orientation, with σ max being E-W.

Q.7 Candidates performed well on this question and examiners saw the whole mark range being used.

(a) Majority of candidates were able to describe the structure and extent of the fault belt.

(b) Examiners saw a wide range of answers here. At the weaker end of the spectrum, candidates giving very basic answers which simply regurgitate or list points but without any discussion or assessment, e.g. "there are faults", as was the case last year examiners saw these as 'token' mention of points and gave little credit. This area of the examination is building on the information candidates study for GL3, and with that, there is a development of their level of answering required for A2 level. Higher end candidates gave more evaluative answers and assessed problems, linking back to the map and individualising their answers to be specific to the map extract provided, eg. the folding and faulting would cause problems with the use of machinery due to laterally discontinuous seams. It was disappointing that a small number of candidates still talked about forestry or housing.

GEOLOGY

General Certificate of Education 2009

Advanced

GL5 Geological Themes

Principal Examiner: Mr. Elliott Hughes

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	**Max Mark**
GL5 (all options)	100

Grade Ranges

Options	**01**	**02**	**03**	**04**	**05**	**06**
A	71	71	70	72	71	71
B	65	64	63	65	64	64
C	59	58	57	59	58	57
D	53	52	51	53	52	51
E	47	46	45	47	46	45
Entry	219	145	138	151	146	131
Mean	63.9	59.9	63.3	60.5	62.7	63.9

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

GL5

General comments

All section A's proved to be very accessible. The essays were very discriminatory with the usual problems of candidates not adhering to the rubric. Spelling continues to be an issue, by far the greatest culprit being the spelling of porous. Also, there were more cases this year of illegibility. Sometimes it is impossible to distinguish words. This can be a particular concern when, for example, words such as “coral” and “coal” are used in the same essay. Many candidates are still not making adequate use of diagrams.

A very noticeable development, and one which is welcomed, is the improvement in candidates’ ability to evaluate. The basic aim in the past has been to set questions which were accessible enough to allow the average candidate to score reasonably with descriptions of geological features. The ability to produce adequate explanations would take candidates to a higher grade. To identify, and extend the best candidates an evaluation was often asked for. This has proved successful in identifying the best candidates and its use has been extended. It was seen as being a high level skill. This year, for the first time, in several essays significant numbers of “average” candidates have been producing impressive evaluations. In fact, with Unit 3 Q.4, it was not uncommon for the evaluations in (b) to be better than the descriptions in (a).

For the first time this year, several candidates decided to use one supplementary booklet to write their answers for both their Units. Candidates should use separate supplementary sheets or booklets for each of their Units.

Unit 1

Q.1 (a) (i) Caused few problems although some candidates referred to pollen content rather than the lithologies.

(ii) Many very vague descriptions such as “juniper and birch increase” to very detailed ones like “juniper peaked first but was replaced by birch and then both declined. ”Some even attempted, usually successfully, to give quantitative descriptions. There was some confusion between trees and herbs and some candidates completely ignored the distinction. A large number failed to note that the birch and juniper declined after their peak.

(iii) Not particularly well answered. Although there were many acceptable answers, candidates were not able to suggest why one species might flourish more than another. The general strain of most of the answers that obtained the 3 marks was “the climate warmed.....juniper peaked.....climate started to cool.....birch replaced juniper as the dominant species.....birch declined.....”

(b) Generally well answered. Most identified the abundance of herb and declining tree pollen, but some were confused about whether this reflected cooling or warming.

(c) Some excellent answers. The better candidates tended to follow the argument of “plenty of organic matter ..... short half-life ..... within the limits of use e.g. 50,000y .....” Claims for the latter tended to be 50,000y although there were many 40,000y and even up to 100,000y. All of these were accepted as part of a reasoned argument.

Q.2 (a) Most candidates gained at least one mark for “earthquakes” and many the second mark for variations of “unstable sediment on the continental shelf.”

(b) (i) Many full marks. Some candidates stated that the grain size gets larger/smaller without stating the direction.

(ii) It is encouraging that the vast majority of candidates now refer to “energy” in their answers.

(c) (i) “Ripples” was the most common response although a significant number apparently did not refer to the scale and suggested “dunes .” A number of the better candidates commented that these could be either water or wind deposited.

(ii) Particularly well done with many candidates exhibiting good skills of data interpretation and expression. To distinguish the two laminations, many wrote “this is a high energy deposit near the bottom of the sequence and so the laminations would have been produced by high flow velocity”. Some candidates who chose W still gained a mark for correctly linking it to either laminations or sand grade.

(d) Reasonably well-answered, most candidates mentioned erosion, but few candidates got the full marks. Often neglected was the possible difference between distal and proximal environments.

Q.3 Generally well answered although high quality essays were lacking. A significant number of candidates described the patterns well, in both diagrams and writing, but were unable to link this convincingly to the geology. However many candidates made things very difficult for themselves by writing essays containing no diagrams. Surface drainage was usually covered much better than subsurface drainage.

Q.4 Not a popular choice but there were some excellent answers. Descriptions of deposits and landforms were generally good although often focussed too much on landforms. However, many of the evaluations were excellent. The fragmentary nature of the evidence is well understood . Only the best candidates noted the importance of evidence from other areas such as fossils and the marine record.

Q.5 The most popular choice.

(a) Eustatic and isostatic sea level changes are now generally well understood although there is still some confusion amongst weaker candidates. Significant numbers of candidates were able to explain adequately the difficult concept of isostatic changes being “local,” while eustatic are “global”. The better candidates also explained why it is often very difficult to distinguish the two, and how this might be achieved. Examples were generally well discussed.

(b) Understanding of this topic has improved dramatically over the past few years. Few candidates now experience any difficulty explaining the basic principles and how they apply to the use of fossil organisms such as foraminifera and to ice cores.

Unit 2

Q.1 (a) (i) The vast majority earned the one mark for relating the kaolin to granites. The other mark proved more difficult and many added nothing to the above. Some stated correctly that there were six localities, all bar one associated with a granite, and others the ENE-WSW trend (NE-SW accepted.)

(ii) Many just stated such as: “kaolin is formed when granite is eroded". Better candidates gave the equivalent of : “kaolin is formed when feldspars are chemically weathered". A few even stated that it is formed due to “hydrothermal reactions” or “hydrolysis of the feldspars".

(b) (i) Very well done. Many full marks although under ‘extraction’ a few candidates got confused between the hosing of the clay and the sand pump.

(ii) Also well done but there were some very vague statements such as “heavy lorries will cause global warming". These were not credited.

(c) Many scored full marks but needed to be specific. Such claims as “it could become a golf course, nature reserve or theme park” would receive no credit. Many suggested such things as “draining the pool and using the spoil heap to infill the void, then topping with top soil.....etc". Others suggested “drain the pool ..... use clay / plastic to line.....use as landfill site.....covers with spoil.....etc". Most of such accounts scored full marks.

Q.2 (a) Most candidates scored 2 marks.

(b) Most scored the one mark for the negative relationship. The most common correct response for the second mark was “as the high grade ore runs out the lower grades have to be mined".

(c) Most scored the one mark for identifying the deficit but only a small percentage suggested recycling as the explanation. More common for the latter was “there was copper left over from previous years’ production.” Although this was not in the mark scheme it was accepted. Even though, in general, this was untrue; it did illustrate the candidates’ ability to reason and so was rewarded.

(d) (i) Few failed to obtain the mark.

(ii) Most obtained the 2 marks.

(iii) This discriminated well. Some preferred to explain why the boundary might go up! Most cited the economic factors such as the price of copper, rather than mining considerations such as improved techniques.

Q.3 Not a popular choice and not well answered. Many found it difficult to stick to the point. A few candidates did not read the question properly and talked about BOTH mineral deposits AND energy resources. Residual deposits and placers were the most commonly focussed on topics but most candidates neglected to mention evaporates. A few candidates focussed too much on the rock cycle rather than on sedimentary processes. Some candidates made life difficult for themselves by not making adequate use of diagrams. Only a small minority of those who attempted this question managed to produce a convincing evaluation. An obvious point to put into this evaluation is that igneous processes are also important – particularly in the formation of mineral deposits.

Q.4. By far the most popular choice producing a full range of responses. The average candidate clearly distinguished source, reservoir and cap rocks; and was able to discuss the function of traps. Diagrams were common and generally well used. There was sometimes an overemphasis on traps at the expense of the other factors. Most candidates ignored the evaluation part of the question and only a small percentage made the point that all were essential. The best candidates, as they discussed each factor, pointed out why they were important and what the consequences would be of their absence. It seems to be almost universally agreed that anticlinal traps are "the best."

Q.5 Geological mapping was the most popular choice, followed by geophysics, geochemical and remote sensing. In all of these the cost was usually considered. However some found it difficult to explain. Thus, for example, mapping was sometimes claimed to be cheap and at other times expensive. Others said that it was "relatively" cheap, but gave no details. The better candidates would give reasons such as "labour intensive" for the mapping and, "remote sensing is relatively cheap because although the satellite images may be expensive, they are already in orbit and large areas can be covered very quickly."

Examiners took a very neutral view as to what was expensive or cheap, and just assessed the explanation. Geological mapping was reasonably well done, although there were many vague descriptions such as "the rocks are looked at" and "structures can be identified." Better candidates referred to dip and strike and the identification of folds and faults. Geophysics was a "breadth versus depth essay" in that some candidates obtained full marks by giving brief evaluations of several techniques, while others concentrated on one (or two) to make their points. Seismic was the most popular, followed by gravity and magnetism. Geochemical descriptions continue to be much improved. Candidates are now well able to describe various techniques and include laboratory considerations. There was a noticeable, welcome rise in the recognition of the possible use of vegetation. Remote sensing was not so well covered. There are still far too many vague statements, such as "satellites can provide much information" without any meaningful elaboration. These do not show whether the candidate really understands the concepts.

Unit 3

Q.1 (a) (i) Caused very few problems.

(ii) This did surprisingly. Many gave SW, having already given it for (i). Also E or E-W were common.

(b) Most gave ripples although dunes were not uncommon. The latter was obviously ignoring the scale but candidates who gave this were not necessarily precluded from obtaining the other 2 marks for a correct origin. The asymmetry was not always commented upon.

(c) Again well done with the same provisos as for (b). Credit was given reluctantly for the term "sun cracks."

(d) There were several ways in which the candidate might obtain full marks here. So long as significant data from the figure were chosen and correctly interpreted, then the marks were awarded. There was also a trade off between depth and breadth. A minority proposed that these deposits were formed by glaciers and ignored, or misinterpreted all the other evidence given in the question.

(e) The response to this was also very encouraging. Several different approaches were accepted so long as the reasoning was sound. Thus "desert.....red beds...large-scale cross-bedding....etc" was rewarded just as highly as "fluvial....high-energy..... well-rounded.....etc."

Q.2 (a) (i) Most answered correctly Cretaceous to Tertiary.

(ii) A mixed response. A significant number suggested geomorphological features such as corries, which would be extremely unlikely to be present after 170Ma. Striations were accepted but the most popular correct response was till or boulder clay. A significant number could not suggest a name but gave a good description for 1 mark, or an excellent description for 2 marks.

(b)&(c) (i) Both of these parts produced similar problems. Many candidates claimed for both parts, for example, that Africa moved east whereas Figure 2 shows that it rotated. Similarly in (c) (i) that Europe moved east.

(c) (ii) Generally well answered showing good knowledge and understanding of the Tertiary Igneous Province. The one common error was to match older rocks (and even fossils) with similar found in North America and Greenland.

Q.3 Generally a good response. The vast majority who attempted this question were aware of the basics such as major faulting and folding and related this to plate tectonics. With better candidates, this progressed to igneous activity and metamorphism. The best candidates were able to make very detailed analyses of some of these, for example discussion of the Tay Nappe or Barrovian Zones of metamorphism. Ophiolites were accepted as being large scale features. It was noticeable that granitic magmatism in Scotland was not mentioned as often as perhaps it should have been.

Q.4 A popular choice. When this question was set (a) was seen as being the straightforward part, and (b) was designed to identify the more able candidates. In many cases the result was the opposite. It was not uncommon for candidates to score more highly on (b) than (a).

(a) This surprisingly caused some problems.

(i) Many candidates were too general in their discussions which, basically amounted to "limestones were formed in the Carboniferous.....today in warm, shallow, clear, marine seas..... therefore, the Carboniferous was tropical." The mention of chalk was not uncommon. There were however some excellent accounts which covered different limestones and fossils, plus some sedimentary structures. Most concentrated on corals and brachiopods as fossil evidence, but trilobites were surprisingly common. Candidates who discussed trilobites, very rarely made a convincing case for them as palaeoenvironmental indicators. Of greater concern were those who discussed graptolites and/or ammonites in some detail.

(ii) There was a disappointing number of discussions of red beds and the associated dune-bedding, desiccation cracks etc, and reference to the ORS. Also much of the discussion of coal measures was very superficial and more or less amounted to "plants die and are buried to form coal." The best candidates referred to cyclothems.

(b) In contrast to (a) this was surprisingly well done. Some excellent discussions. It was very encouraging that so many candidates were able to outline present climatic zones and then suggest why, and how, these might not have been replicated in the past. Many good candidates made a point of explaining how this is an example of why the Law of Uniformitarianism might not always be applicable.

Q.5 Overall, not a popular choice. A very varied response. Few mentioned the evidence for the convergence direction, or coal fields in synclinal basins. The Lizard ophiolites were often not considered. Better answers discussed most of the above and also crustal melting due to collision. The declining effects of the Variscan orogeny as you go north within Britain was also often ignored. Some mixed up Caledonian with Variscan events. Very few candidates attempted any evaluation.

Unit 4

Q.1 (a) (i) Caused few problems although some did not specify ***reverse*** faulting.

(ii) Most candidates obtained this mark.

(iii) Very few candidates scored full marks. Many answers confused elastic, plastic and brittle terminology. The best candidates considered the elastic limit.

(b) (i) Well done. 5.6m to 5.9m was the accepted range for final length. However, some candidates who were outside this range were still awarded marks for the correct use of the formula.

(ii) Most candidates correctly identified the problem with the jointing on the upper surface.

(iii) Most candidates were able to refer to the changing thickness of the shale, or the faulting of the shale and sandstone as being problems.

Q.2 (a) (i) Most candidates obtained one or two marks. The biggest problem was candidates' inability to describe arcs adequately without using the term. A typical 2 mark response was similar to "they trend approximately ENE-WSW following the Alaskan coastline and then the islands of the Bering Sea."

(ii) Most had the correct shape for the trench but many positioned it incorrectly - just north of the accretionary prism.

(iii) Well answered. Both the alternatives of weight of basin sediments or compression due to plate movement were common. Either proposing both or describing one secured the 2 marks.

(b) Better candidates had little difficulty describing how accretionary prisms form. Although it was not essential in obtaining the 4 marks, most candidates did not attempt to explain the age relationships of the wedges.

(c) Some very good answers. One of the most common incorrect responses was that the ice made the crust so cold that the magma would solidify before reaching the surface.

Q.3 This was a very popular question. The descriptive part of the question was generally well answered and it was good to see diagrams from most candidates. Most were able to describe the evidence for this layering (seismic work, ophiolites, and ocean drilling,) but few candidates were properly able to evaluate the evidence. One thing that could have been mentioned was: ophiolites may not represent true oceanic crust (most are likely to have formed in back-arc settings). Another is that ocean drilling is expensive, does not penetrate very far and there are only a relatively small number of holes that have been drilled.

Q.4 Only attempted by a small number of candidates and generally quite poorly answered. The main problem was that there was too much focus on the general features of an orogenic belt and often only a brief mention of the importance of crustal melting. Very few candidates attempted an evaluation.

Q.5 This was a popular question. Many candidates spent too much time describing the finer points of seismic surveying and how P and S waves might identify the (deep) internal structure of the Earth.

Most candidates identified the significance of the LVZ. However, many are stating that it contains 5% magma. The general modern consensus is that the amount of magma in the LVZ is not more than 0.5% - with most workers favouring <0.1%. (A point to note is that if the LVZ contained 5% magma, then intraplate magmatism would be much more ubiquitous on Earth than it is. Any zone of crustal weakness/lithospheric thinning would result in volcanic activity). Very few candidates were able to comment authoritatively on the reliability of the techniques.

GEOLOGY

General Certificate of Education 2009

Advanced

GL6 Geological Investigation

Principal Moderator: Mr. Ian G. Kenyon

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
GL6	927	60	43.2

Grade Ranges

A	48
B	42
C	36
D	30
E	24

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

GL6

Administration

The administration and moderation of the coursework samples ran smoothly once again this year. The Principal Moderator is very grateful for the efficient organisation and punctuality of the majority of centres. Only a small number of centres submitted materials after the May 1st deadline.

Packaging Coursework

When packing the coursework samples please try to reduce bulk and weight as far as possible. A4 hardback ring binders should not be used. It is helpful (and cheaper for centres) to use slim plastic folders that can be packed efficiently. The use of large and heavy field notebooks containing only a few pages of assessed material is to be discouraged. Please consider detaching the relevant pages of field notes and inserting them in the front of the report with a paper clip. Alternatively photocopy the relevant pages and include in the front of the report. All materials for moderation should be included in just one modest sized package.

Please note that the coursework samples for GL6 and GL2B should not be sent together in the same package as they are moderated by different examiners. If centres are unsure about the address for despatch, they should contact WJEC for clarification.

Fieldwork and Laboratory based Investigations

Please note that the requirements for GL6 are a minimum of two investigations. The assessment must be a minimum of 50% field based work and a minimum of 25% laboratory based work. Therefore only two possible combinations are available. Field 50%, Lab 50% or Field 75%, Lab 25%. Please state clearly on the GLF1 form whether Lab (L) or Field (F) is being assessed. It is not appropriate to write F/L.

Please note that from 2010 onwards, the laboratory based component is optional. Centres may submit two field based investigations for assessment if they wish to do so.

GLF 1 Forms

A completed GLF 1 form should be included with the coursework sample. This is used by the moderator to make any recommendations for mark adjustments. Please note it is not necessary to write out the details of the investigations undertaken in the space allocated on the right hand side of the form. The GLF1 form should list <u>all</u> candidates and their marks from the centre, not just those selected as a sample for moderation. It is helpful to mark with an asterisk on the left hand side those which are included in the sample.

GLF 2 Forms – The Tracking/Planning Sheet

A completed GLF 2 form should be included for each investigation undertaken, i.e. two for each candidate in the sample. This is used primarily to assess the planning of the investigation. The quality of the planning sheets varied from exceptional, exhaustive and comprehensive to inadequate, over-brief and quite vague. The best marks for planning were achieved where students carried out a pilot study to test their planning, then modified the original plan in the light of this. A significant number of centres were over-generous on awarding marks for planning. It is not possible to score full marks on this section when candidates have failed to make any predictions about possible outcomes and anticipated sources of error.

These sheets can be enlarged to A3 where space is insufficient. Additional planning information can be included at the beginning of the written report under a clear 'planning (GLF2) continued' heading.

Students should be encouraged to plan in detail and should be discouraged from using simplistic bullet point statements on the planning sheet.

GLF 3 Forms

A completed GLF 3 form should be submitted for each candidate in the sample. Please make full use of the opportunity to comment on the work of individual candidates on the GLF 3 form. Ideally the use of 4 'post-it' notes should be used to locate within the work, where and why the marks have been awarded. A few centres still fail to comply with this request each year and possibly disadvantage their candidates as a result.

Please ensure that the centre has the updated GLF3 form which has the candidate declaration on the reverse. This must be signed by the candidate and teacher to confirm the authenticity of the work being submitted.

Downloads from WJEC

Copies of the forms GLF1, GLF2 and GLF3 can be downloaded directly from the WJEC website www.wjec.co.uk by following the GCE/AS subjects and then Geology links from their home page.

C Forms

Please note that the C forms (red/pink) for recording candidates' marks should be sent directly to WJEC and not the moderator of coursework.

Implementation

In order to provide evidence for implementation, it is vital that the appropriate field and laboratory notes are included with the report.

A small number of centres failed to include the laboratory notes again this year.

It should also be noted that laboratory work must yield some raw data that could not be collected in the field. Bringing back rock samples then describing them as in a 'traditional' practical is not really in the spirit of the assessment.

Good examples of lab work included:

- Making thin sections of rock samples followed by microscope analysis.
- Sieving sediments and calculating sorting, skewness and kurtosis.
- Establishing composition of sediment samples using point counts.
- Testing rock samples for resistance to abrasion, impact and polishing.
- Modelling rock deformation using plasticine and mars bars.
- Simulating mass movements and tsunami generation in a wave tank
  Porosity and permeability of rocks related to their utilization potential.

- Testing the resistance of various mollusc shells to abrasion/attrition and linking to preservation potential.

The overall quality and quantity of the lab and field notes were a little disappointing again this year and could easily be improved upon. Field sketches were particularly poor.

Ideally each field location should have a six-figure grid reference. If sites are close together, then the same reference should be given with '12 metres west of site 4'. It was pleasing to note some very accurate fieldwork locations were given by a few centres using GPS.

All field sketches should have grid reference, scale, compass orientation and detailed annotations. Simplistic labelling of sketches should be discouraged.

Information from secondary sources such as bed ages or detailed palaeogeographies should not appear in the field notes. Photographs are also inappropriate in the field notes. The field notes should be used to interpret the photographs in the report.

Field notes should consist of detailed observations, measurements and records made individually by each candidate. Identical notes obviously dictated in the field are to be strongly discouraged.

It is strongly recommended to practise field sketching from photographs or slides prior to fieldwork being carried out. The field and lab notes provide the basis for the report and should be considered the most important part of the investigation.

Analysis

This involves some synthesis and interpretation of the primary data collected in the lab or field. There must be some development from the field or lab notes, rather than simply copying out the same information in a neater form.

The use of photographs is to be strongly encouraged but these should be used selectively and integrated within the text. Transparent overlays or outline diagrams adjacent to photographs may be used to highlight important features or annotated digitally. Grid reference, compass orientation and scale should be included as a matter of course.

Please discourage the indiscriminate use of photographs, which lack location and annotations. Only include photographs, which are directly relevant to the investigation. As a general guide no more than 8 to 10 photographs should be included. Less than half the candidates included photographs this year and the majority were poorly annotated.

Statistical analysis is recommended if it is appropriate to the data collected. Excellent investigations on sedimentary environments included work on sorting, skewness and kurtosis. Particle size and shape was assessed using Zinng's, Krumbein's and Cailleux's indices. Spearman's Rank, Chi Square and Vector analysis were also used by some centres. Point counts were used to assess the mineralogical composition of rock and sediment samples.

Spreadsheets were used by a number of centres, but not always to the best effect. Printouts of cumulative frequency graphs, Zinng diagrams and histograms were rarely annotated to show evidence of thorough analysis and interpretation.

Evaluation

Evaluation must be included as a separate section within the report. It is an opportunity for students to reflect objectively on the work they have carried out. The quality of evaluations varied from sophisticated and thorough to simplistic and inappropriate. It may be worthwhile suggesting to students to break up the evaluation into a number of distinct components:

Evaluating the planning sheet they completed. How appropriate were the techniques and methods they selected? This may refer to methods of sampling, sample size and sample number.

What problems or limitations were encountered during implementation? This could involve reference to confusion between true and apparent dip or problems between the base map geology and actual rock outcrops.

An outline of the way in which the investigation could be improved, given more time and/or resources and with the benefit of hindsight.

An overview of the investigation based on the likely reliability/validity of the data collected in the available time frame. Which part(s) of the investigation(s) yielded the most/least reliable data and why? Are the conclusions made concrete, tentative or partial? How do these findings compare with published work on the same area/topic. How do they compare with the results/conclusions of students from last year?

Evaluation is not a list of excuses. Naïve and simplistic statements regarding lack of time, bad weather and lack of familiarity with equipment do not form the basis of a mature evaluation. As a rough guide one side of A4 word-processed text is a probable optimum length for evaluation.

The Report

It is now expected that students make use of IT and finish reports to a professional standard. It was encouraging to see so many centres making appropriate use of IT this year and just a few hand-written reports were submitted this year.

As a rough guide, the optimum length for each report should be between 1250 and 1750 words. This excludes maps, diagrams, photographs, graphic logs and statistics. Quality rather than quantity is to be encouraged. The reports should be concise, relevant and clearly focused.

Please dissuade students from including large amounts of photocopied material from secondary sources.

The report should be based on the primary data collected in the lab or field and there should be some cross-referencing between the two. Safety considerations should be briefly acknowledged and students should be encouraged to be aware of the importance of the need for conservation of geological sites. The report might include the following sections, though they may be subsumed under a smaller number of headings:

- Contents Page
- Location Map
- Introduction
- Aims/Hypotheses
- Safety Aspects
- Methods Of Data Collection
- Data Presentation
- Data Analysis
- Statistical Analysis
- Graphs/Printouts With Annotations
- Photographs With Annotations
- Conclusions
- Evaluation
- Bibliography
- Acknowledgements

Standards

The standard of coursework submitted this year represents yet another improvement on last year as many centres have again clearly acted upon the advice given on moderator feedback forms. Teacher marking is now very close to that of the principal moderator on all four components of the assessment criteria. In 2009 two centres were adjusted downwards and two were adjusted upwards.

Help and advice is available from the Principal Moderator at any time. Contact email address iangkenyon@aol.com

Telephone (01872) 554469 (Home) or (01872) 272763 (School) (07971) 961365 (Mobile)

Coursework for 2010 can be submitted any time after 1st April 2010. The deadline for submission is May 15th 2010.

WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk