



GCSE EXAMINERS' REPORTS

GEOLOGY

SUMMER 2011

Statistical Information

The Examiners' Report may refer in general terms to statistical outcomes. Statistical information on candidates' performances in all examination components (whether internally or externally assessed) is provided when results are issued. As well as the marks achieved by individual candidates, the following information can be obtained from these printouts:

For each component: the maximum mark, aggregation factor, mean mark and standard deviation of marks obtained by *all* candidates entered for the examination.

For the subject or option: the total entry and the lowest mark needed for the award of each grade.

Annual Statistical Report

Other information on a centre basis is provided when results are issued. 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 Secondary Education

Summer 2011

Chief Examiner: Dr Alan Seago

Candidates were entered by 65 centres – including many new centres – and the overall entry increased by about 10% to over 1100 candidates. It is encouraging to report that this increase is set to continue with numbers of students opting for Geology increasing in many centres and several centres preparing to enter their first groups in 2012.

This was the first year of the non-tiered written paper provided as an on-screen test. Despite the paper being successfully tested on many occasions beforehand, there was a problem with the software and a number of centres experienced a range of difficulties. Some candidates were able to carry on and complete the on-screen version whilst others switched to the paper back-up to answer at least some of the questions. There were other glitches in the system such as the software not recording candidates' answers or moving arrows back to their parked position after they had been moved into the appropriate boxes by the candidates. Examiners highlighted problems on individual candidate e-scripts and appropriate allowances were made following the completion of marking. Every possible measure was taken to ensure that no candidate was disadvantaged by any of the problems described. On the positive side, many candidates enjoyed the on-screen examination, including the question styles, and appreciated the high quality of diagrams and photographs used.

It is pleasing to report another successful year for centres with some exceptional work seen in the examination and controlled assessment element.

On-Screen Examination

The examination follows the style of the previous specification Foundation Tier Paper 1 but with an additional element of extended writing required towards the end of each question.

In general, the ability of candidates seemed very close to that seen in 2010. All candidates were able to gain significant marks on each question, but questions requiring extended responses differentiated well between candidates attaining the highest grades. Questions set on some of the new additions to the specification were not always answered well.

- Q.1 This question tested the ability of candidates to interpret data from an outcrop containing a sequence of faulted rocks which had been intruded by a mineral vein.
- (a) Most candidates could identify the shale and ammonite and give an explanation of its Jurassic age, either using the law of superposition or the nature of the suture line. Despite recognising the ammonite, some candidates had difficulty deciding on the environment of deposition of the rock it was found in.
 - (b) Most candidates correctly described the texture of the till, its transport by ice and the composition of the erratic.
 - (c) The usual confusion over normal and reverse faults was evident resulting in the incorrect interpretation of the stress directions.
 - (d) Candidates had no difficulty identifying the minerals but explaining the origin of hydrothermal veins and the calculation proved more challenging.
 - (e) Candidates could comment on the palaeolatitude of corals in particular but this was often the limit of the answer. Candidates also made the mistake of confusing environment with latitude e.g. arid environment instead of desert latitude or low latitude near the equator.
- Q.2 This question tested the relationship of geology to the landscape – a new section of the specification – and it was not very well answered.
- (a) Some candidates found estimating the angle of dip difficult. Instead of describing the relationship of geology to the landscape many candidates described the geological history exhibited by the cross-section. Other candidates were not precise enough in their description of the rocks and did not use terms such as permeable/impermeable.
 - (b) Many candidates placed the events in the wrong sequence which is surprising considering that this was a regular Paper 2 question on the previous specification. Many candidates interpreted the photograph of limestone pavement as desiccation cracks or the product of freeze/thaw weathering and hence described the weathering process as physical.
- Q.3 This question was based on the features of a constructive plate margin.
- (a) Most candidates correctly interpreted the age of the ocean crust, its composition and the direction of plate movement. Defining the lithosphere was much more challenging and candidates had difficulty producing a coherent description of sea-floor spreading.
 - (b) Most candidates correctly identified pillow lavas from the photograph but all of the other options proved to be successful distracters. Again the description of the formation of pillows proved difficult and some descriptions followed the incorrect identification given in the previous answer.

- Q.4 This question tested candidates' knowledge of the rock cycle and involved map work and graphical skills.
- (a) Most candidates correctly identified the processes of the rock cycle.
 - (b) The textures of the metamorphic rock proved challenging for some as was the identification of the rock as metamorphic and a schist. Recrystallisation was probably not the commonest answer for the origin of the garnet and all of the alternatives proved to be effective distracters.
 - (c) Some candidates mistakenly identified the igneous body as a dyke but most correctly interpreted its field relations. Some candidates ignored the scale of rock F and identified it as basalt. Unfortunately the software played tricks with the plotting of the graph and for some candidates this was the end of the on-screen version of the paper. However, the points were generally correctly plotted and interpreted.
- Q .5 This question tested tsunami – a new addition to the specification - and was well answered.
- (a) Most candidates identified the source of the earthquake as a subduction zone and were able to use the map to determine the arrival time in Sri Lanka. Calculating the speed of the tsunami proved to be difficult for some candidates.
 - (b) Describing the speed and size of the tsunami wave provided no problems and neither did the difficulty of detection in deep water. Most candidates could describe three ways of preventing loss of life if the event was repeated.
- Q.6 This question was based on natural resources and tested a variety of Earth resources including water, oil and renewables.
- (a) Most candidates interpreted the graph correctly and identified sandstone as the rock with the highest porosity. Most candidates knew the terms aquifer and liner and could use the graph to identify the rocks. Many candidates did not know the difference between porosity and permeability.
 - (b) Although most candidates recognised that shale was impermeable, many did not state that limestone was a good foundation for the dam because of its strength. The permeability of limestone was identified as a reason for leakage under the dam but few commented on the dip angle.
 - (c) Most candidates identified the anticline and salt dome traps but all of the survey techniques proved to be good distracters.
 - (d) Interpreting the energy production/consumption graph did not prove to be a problem and most candidates were familiar with renewable energy resources and their impact on the environment. Describing two disadvantages of nuclear power proved to be difficult for many candidates.

- Q.7 This question tested vertebrate evolution and mass extinction – topics new to the specification - and was largely based on interpretation of the Data Sheet.
- (a) Strangely, candidates did not use the Data Sheet well to answer the questions on vertebrate evolution and many errors were apparent.
 - (b) Knowledge of evidence for the K–T extinction event was patchy, with some candidates able to describe craters and ejecta in great detail whilst others had little idea about any of the evidence and described variation in fossil numbers.

Controlled Internal Assessment

WJEC and the Moderators recognise the effort and enthusiasm that geology teachers invest in their candidates, which certainly shines through in the quality of reports presented. As was hoped the majority of centres based the assessment on their own fieldwork, but it was pleasing to see that those who completed the task based on WJEC prepared materials (Option 1) also produced some high quality work.

Administration

The administration and moderation of the controlled assessment samples ran smoothly once again this year. The Moderators are very grateful for the efficient organisation and punctuality of the majority of centres. The new system of coursework approval assisted centres by highlighting possible problems at an early stage. The use of inappropriate activities was not entirely removed but there were fewer incidences than have been seen in the past.

Points which can be emphasised as a result of this year's submission include:

- A GL1 form should be included with the coursework sample.
- There were occasional errors in addition and discrepancies between marks recorded on the candidates' work and on the GL1 or GL2 forms.
- The marks of **all** candidates within a centre must be recorded on the form.
- Centres where some candidates have completed Option 1 and others Option 2 should make this clear on the form, and examples of both should be included in the sample.
- In some cases GL1 was not completed in **rank order** and therefore the sample was incorrect.
- The fieldwork proposal form should be included with the work submitted to the Moderator.

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 or photocopying the relevant pages of field notes and inserting them in the front of the report with a paper clip.

Option 1 Virtual Fieldwork

A small number of centres attempted this option. The introduction of the virtual fieldwork was generally a success. Centres were obviously familiar with the type of material presented from previous experience of the previous specification Paper 2. Centres experiencing difficulties accessing suitable fieldwork locations might consider switching to this option in the future.

Candidates handled the data efficiently and logically and demonstrated their geological skills well. The observations in the field notes were accurate in the main and clearly recorded, particularly the specimen descriptions. In the analysis, the rose diagram was accurately drawn and good use was made of geological cross-sections in some cases. Marks awarded were a little generous and it was felt that the highest marks could only truly be justified in cases where candidates had included additional evidence e.g.

- fully labelled field sketches
- annotation of the photographs
- a summary geological history (in the form of a table)
- more detailed planning of the extension
- more thorough evaluation of the accuracy of the equipment
- an **interpretation** of current direction from the rose diagram of graptolite data
- graph of clast size of conglomerate (rarely attempted)
- inclusion of cross-sections across the map

Option 2 Actual Fieldwork

Some excellent field investigations are being perfected by centres. The best investigations allowed candidates to demonstrate essential field skills (such as rock descriptions, field sketching, fossil identification, dip and strike and sedimentary logging) and to use suitable analytical techniques on the data collected. It is good to see geological field skills being demonstrated with a high degree of competence. The work produced by the best candidates would be a credit to students at a higher level and centres are congratulated on the continuing quality of work submitted.

A range of field tasks were undertaken, including investigations involving:

- interpretation of sedimentary environments
- mapping exercises leading to geological sections and history
- structural analysis such as assessment of the degree of crustal shortening and joint analysis
- fossil studies
- clast analysis of pebble beds and interpretation of environment
- igneous structures e.g. dykes

Centres are to be congratulated on the variety of opportunities given to candidates in areas of outstanding geology such as the Dorset Coast, Lulworth, North Devon, Cornwall, Vallis Vale Gloucestershire, Traeth Bychan Anglesey, Thurstaston Wirral, Arran, Ogmere, Llangollen, A6 Crookdale Crag Lake District, Yorkshire Coast, Yorkshire Dales, Sedbergh, Peak District, Shropshire, Pembrokeshire, Isle of Man, Sussex Coast, Pennines and Hampshire. Other centres used a variety of local geological locations.

However, work submitted by some centres was found to be limited and therefore did not allow candidates to access the full range of assessment criteria. The following points should be noted:

1. Where samples have been collected and processed in the lab for sieving and microscope analysis this laboratory work should **not be assessed** as the specification states that the controlled assessment should be a **field** investigation. This could leave the field investigation very limited in terms of the variety of observations and analysis that can be completed by candidates.
2. Some centres do not seem to be fully aware of the new assessment criteria. Planning was incorrectly assessed as part of the field investigation carried out by the candidate and devised by the centre. The specification clearly states that the controlled assessment is a directed investigation planned by the centre and **planning** is assessed as an **extension** of the centre planned investigation. The main investigation should be planned in detail by the centre and the plan provided to students, who then plan a further investigation as the final part of the assessment.
3. A problem in some cases was a lack of focus for the investigation. If clearly focused, for example, on 'the environment of deposition of the Purbeck beds of Lulworth Cove', candidates can concentrate on collecting data such as grain size, sorting, sedimentary logging and fossil content. With a lack of focus and definition of aims, candidates may spend much of their time in the field collecting irrelevant data and be distracted from the main investigation. Candidates who are unsure of the aim of the investigation often produce a disjointed report and rarely access the higher level assessment criteria.
4. Some candidates had little or no data in the field notes yet were able to produce lots of data in a report.
5. 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 and sedimentary logs should be part of every investigation, where appropriate.
6. Some thought has to be given at the data collection stage as to whether the form of the data being collected is suitable for processing and analysis, e.g. histograms, cross-sections, logs, rose diagrams maps and geological histories.
7. 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.
8. It is strongly recommended that candidates practise field sketching from photographs or slides prior to fieldwork being carried out. The field notes provide the basis for the report and should be considered an important part of the investigation.
9. Evaluation is a difficult skill which requires more attention within the teaching scheme. The emphasis of this skill has now changed to an evaluation of the methods of data collection, including an awareness of the accuracy of equipment and methods used for making the measurements. **Evaluation is not a list of excuses.** Simplistic statements regarding lack of time and bad weather do not form the basis of an evaluation with any merit.

Assessment

Many centres are to be congratulated on the accuracy of their assessment and the need for scaling is progressively being reduced. There are four main reasons why scaling has to be applied:

- Awarding of marks on inappropriate tasks e.g. lack of focus to the investigation or lack of opportunity for candidates to collect suitable data. To avoid this, advice is given to centres during the accreditation stage.
- Reliable rank order but marks generous or severe. This can be rectified by scaling but scaling is a crude instrument and can be disadvantageous to some candidates.
- Failure to recognise that candidates have not met some aspect of the specification, e.g. not planning an extension to an investigation already carried out. This can be avoided by careful reading of the specification.
- Failure to show how criteria have been achieved by annotation of candidates' work.

Accurate but brief annotation is beneficial to the candidates.

Support

The Moderators are always willing to provide as much support as is requested by the centre. Centres should be aware that guidance is available from WJEC throughout the year. Moderators' Reports are produced following all submissions and centres are urged to act on any recommendations made before tackling the assessment for 2012. Moderators do not enjoy moderating work which achieves low marks as this is going to be disappointing for the centre and 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. Further CPD sessions covering the specification, examination and controlled internal assessment are scheduled for autumn 2011 and new centres in particular are urged to attend. Additional guidance, including advice on the suitability of field investigations prior to carrying them out, and consultative moderation is available by contacting the Subject Officer/Chief Examiner.

The fieldwork proposal for Option 2 should be submitted to Jonathan Owen/Alan Seago at least one month before undertaking the field work. For further support contact Jonathan Owen (jonathan.owen@wjec.co.uk) or the Subject Support Officer at WJEC (sarah.price@wjec.co.uk). Centres can also contact the Chief Examiner direct at the following email address: a.seago@open.ac.uk



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