



# **GCSE EXAMINERS' REPORTS**

**GEOLOGY**

**SUMMER 2014**

## **Grade Boundaries**

Grade boundary information for this subject is available on the WJEC public website at:  
<https://www.wjecservices.co.uk/MarkToUMS/default.aspx?l=en>

## **Online results analysis**

WJEC provides information to examination centres via the WJEC secure website. This is restricted to centre staff only. Access is granted to centre staff by the Examinations Officer at the centre.

## **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 Secondary Education**

**Summer 2014**

*Chief Examiner:* Dr Alan Seago

### **On-screen Examination**

The on-screen examination ran very smoothly with virtually all centres being able to complete on-screen as intended. Feedback from centres suggested that the candidates enjoyed the experience, especially the quality of the diagrams and style of questioning, and found the examination a fair test.

It is pleasing to report another successful year for centres. Candidates across the full ability range showed positive achievement and the cohort again included some exceptional candidates.

### **General Advice**

Questions should be read carefully, e.g. in Section 2, a number of candidates tried to explain the difference between a lava flow and a sill in Q11 and many ignored the younging arrow in Q13. It was evident that candidates found the extended writing more challenging than the other styles of questioning. Poor grammar often detracted from the clarity of the answer and this was taken into account in Section 2 Q14 and Section 3 Q10 in particular. Candidates should be encouraged not to rush through multiple choice questions as all should be able to complete the examination well within the time permitted.

The report will concentrate on questions requiring written responses, which were marked by examiners, rather than objective questions which were machine-marked. Sections 4 and 5 proved to be the most challenging whilst candidates achieved the highest mean mark in Section 7.

### **Section 1**

This was a question which tested the ability of candidates to recognise and interpret an unconformity and the textural significance of a breccia. Some candidates had difficulty placing the events for the formation of an unconformity in the correct order in Q2, which was a relatively straightforward sequence in comparison to the convoluted geological histories presented in previous GCSE papers. Many candidates successfully explained the significance of grain shape as indicative of the length of transport in Q5, however the lack of use of geological terms such as attrition and abrasion was disappointing. Candidates who tried to explain the significance of grain size or sorting were less successful. In previous years the description of freeze thaw weathering has been very good but for some reason Q6 was not well answered and many candidates erroneously described the erosional process of ice plucking.

## Section 2

A generally well answered section which was a wide ranging question based on the geology of the Whitesands area. In Q9 candidates were confident that the half-life was information needed to date rocks but less sure of the need for the parent-daughter isotope ratio. Q11 asked candidates to describe the differences between a sill and a pluton although some tried to explain the differences between a lava flow and sill. Few candidates could describe two distinctions but most described either the concordant nature of the sill or the rounded shape of a pluton. Some recognised that the sill was folded and realised this may be significant but had difficulty putting that into words. Many candidates reversed the order of graptolites 1 and 3 in Q13. I suspect that some candidates did not look at the younging arrow and placed the graptolites in the correct order but upside down. Candidates must look very carefully at the information given in diagrams. When using the map and photograph to interpret landforms in Q14, candidates could often explain how the resistant rock formed the headlands or hills and the soft shale formed the bay but few referred to both. A number of candidates tried erroneously to link soft sandstone with the beach deposit but few linked the beach to lower energy conditions in the bay.

## Section 3

This was based on the interpretation of the Nazca/South American oceanic-continental convergent plate boundary. Most candidates could describe the distribution of the earthquake foci and go some way towards an explanation of their distribution in Q5. Large numbers of candidates thought that the ocean trench was a location somewhere on the magnetic profile and the ridge crest was often incorrectly located in Q6. Most candidates could state two methods which could be used to predict volcanic eruptions in Q10 but sometimes the description was confused or absent. Candidates who answered the question well mostly described the method and instruments used, e.g. increase in seismicity and seismometer, or change in shape of the volcano and tiltmeter.

## Section 4

This was a question on geological structures and oil traps. Both Q11 and Q12 proved to be challenging although most candidates picked up a proportion of the marks. Once again it is apparent that the understanding of basic geological measurements (dip and strike) and their relationship to north is a difficult concept for candidates. Similarly candidates have difficulties with geological maps. These skills were once second nature to GCSE candidates but perhaps less focus on teaching such things is one of the consequences of the on-screen assessment. Map-work remains an important part of the specification. Obviously cross sections cannot be constructed by candidates on-screen but the interpretation of maps and cross sections are important geological skills which need to be assessed.

There were some traditional questions on oil traps and exploration but the use of oil and gas fields for storage of carbon dioxide has not previously been tested. Candidates' ability to describe the basic principles using geological terminology was poor. There was rarely a mention of porous reservoir rocks and impermeable cap rocks as important features in the storage of carbon dioxide in Q17.

## Section 5

This was a question on mineral exploration and the environmental effects of mining. In Q4, few candidates could explain the results of the magnetic survey in terms of the presence of magnetite or iron ore in mineral vein 1. The other more traditional questions in this section were well answered.

## **Section 6**

A wide ranging set of questions based on a sedimentary log and associated fossils. Candidates' knowledge of fossil groups and their modes of life was very good. When it came to the explanation of the presence of plants, corals and trilobites in the same bed of rock candidates were found wanting. Most explanations incorrectly involved methods of preservation of plant fossils by carbonisation. Candidates' knowledge of sedimentary structures was good. In Q16 candidates either went for an explanation based on changing latitude of the UK or the climatic conditions at the time, both of which were acceptable answers.

## **Section 7**

This section led candidates through a discussion of energy resources and the problem of increased carbon dioxide in the atmosphere, feedback mechanisms and finished with an explanation of the enhanced greenhouse effect. Candidates were well informed in a geological context and also used their knowledge from other subjects. Candidates succeeded in interpreting data presented in several forms in Q1, Q4 and Q5 and in calculating and comparing the relative contributions of volcanoes and man to atmospheric carbon dioxide levels in Q2. Most candidates demonstrated some understanding of the greenhouse effect and many provided a complete explanation of the enhanced effect caused by the burning of fossil fuels by man.

## **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 work that they produce. Sixty centres submitted coursework for moderation this year.

### **Administration**

The administration and moderation of the coursework samples ran smoothly once again this year. The moderators are very grateful for the efficient organisation and punctuality of the majority of centres. The system of task accreditation assisted centres by highlighting possible problems at an early stage. The use of inappropriate tasks has not been entirely removed but this is now a problem at only a very small number of centres.

Some centres did not complete a Task Accreditation Form (Option 2) for 2014. All centres should ensure that this form is submitted at least one month before the field work for the 2015 assessment is to be carried out.

The following points are emphasised as a result of this year's submission.

- Please enclose a copy of Task Accreditation Form when the sample is sent to the moderator. This greatly assists the moderation process.
- Where a centre has some candidates who have completed Option 1 and others Option 2, this should be made clear on the GL2 form. Examples of both options should be included in the moderation sample, even though this may require additional candidates' work being sent.
- Mark totals should be double-checked and great care taken to ensure that these are correctly entered into the electronic mark input system.

### **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 attaching them to the front of the report e.g. with a treasury tag. Please label coursework notebooks with candidates' names and numbers as notebooks often become separated from reports in transit.

## Option 1

A small number of centres submitted work based on the Option 1 pack. Centres experiencing difficulties with Option 2 might consider switching to this option in the future.

It was pleasing to see that a number of centres who had entered candidates for this option in 2013 gained enough confidence to devise and carry out their own task this year. This is to be encouraged as greater experience of field work benefits candidates in all aspects of assessment and in broader terms.

Candidates handled the data efficiently and logically and demonstrated some geological skills well. The observations in the field notes were accurate in the main and clearly recorded, particularly the specimen descriptions. However, one or two centres had no distinguishable field notes or merely annotated the photographs without drawing field sketches. The rose diagram was accurately drawn and roundness and sphericity of clasts were accurately recorded. 'Planning an extension' is challenging for centres who attempt this option without any field experience. It is also difficult for candidates to demonstrate any individuality with this option.

Marks awarded were sometimes on the generous side and it was felt that in order to justify the higher marks, candidates should have included most of the following:

### Field notes

- labelled field sketch of fold at locality 1
- description of texture and mineralogy of specimen A (granite)
- description of specimen B (chistolite hornfels)
- labelled field sketch of unconformity at locality 4, measured dip angle of lower beds
- description of breccia at locality 4
- graphic log of locality 4
- table of size, roundness and sphericity of breccia clasts at locality 4
- description of mineral C (calcite)
- description/sketch of specimen E (goniatite)
- field sketch of cross bedding at locality 6, current direction/scale/compass bearings

### Report

- interpretation of the trend of folding/Variscan orogeny/direction of max pressure
- description of the intrusion of the granite pluton and contact metamorphism
- graphic log of locality 4
- sequence of events to form an unconformity
- rose diagram of clast orientation of breccia at locality 4
- graph of size, roundness and sphericity of breccia clasts
- annotated photographs
- interpretation of rose diagram and environment of deposition of the breccia from graphs
- type of mineralisation/age of rocks from goniatite
- direction of currents at locality 6 using cross bedding
- interpretation of changing geological environments of deposition from fossils/sediments/data
- cross section of the map
- geological history table summary as well as in words e.g. deposition, folding, granite intrusion, metamorphism, unconformity, dyke
- description of coastal morphology
- realistic and detailed planning of the extension
- thorough evaluation of the accuracy of the data

In the absence of such evidence it was difficult to justify some of the high marks awarded.

## Option 2

There were some excellent field investigations seen. The best investigations allowed the candidates to demonstrate essential field skills (such as rock descriptions, field sketching, fossil identification, dip and strike and sedimentary logging) and perform 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 by their candidates.

A variety of field tasks was undertaken including:

- 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
- investigation of 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 Purbeck, Lulworth, Peak District, Wenlock Edge, Gullet Quarry, Bridgnorth, Shap, Bude, Traeth Bychan (Anglesey), Clevedon, Arran, Ogmores, Barry, Falkland Islands, Crookdale Crag (A6 Shap), Castleton, Blackstone Edge, Broad Haven (Pembrokeshire), Whitesands (Pembrokeshire), Stackpole (Pembrokeshire), Cheddar Gorge, Shropshire, Black Mountains, Prestatyn, Amroth (Pembrokeshire), Isle of Man, Portishead, Ballycastle (Northern Ireland) and Walton on the Naze. Other centres used a variety of local geological locations.

Please note the following main issues and areas of concern which need to be addressed by some centres prior to completing their controlled assessment task for 2014-15.

1. Some centres do not seem to be fully aware of the 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 via the extension which candidates plan at the end of the investigation. The main investigation should be planned in detail by the centre and the plan provided to the students who then plan a further investigation based on the model they have used.
2. Some candidates had little or no data in the field notes yet were able to produce lots of data in a report.
3. 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.
4. Some thought has to be given at the task planning/accreditation stage as to whether the data to be collected by candidates is suitable for processing and analysis, e.g. using histograms, cross-sections, logs, rose diagrams, maps and geological histories.

5. 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.
6. It is strongly recommended that candidates practise field sketching from photographs or slides prior to field work being carried out. The field notes provide the basis for the report and should be considered an important part of the investigation.
7. 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, which includes an awareness of the accuracy of the 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.
8. Presentation of work was generally good and many centres have found a suitable way to allow candidates to use ICT in the production of their reports without them being able to access their work outside the classroom. This will not be possible for all centres and well-presented hand-written work is perfectly acceptable – however the hand writing must be legible. 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.
9. Some centres did not heed the advice given in previous Moderators' Reports.
10. Centres carrying out the controlled assessment at Field Studies Centres should make sure that staff are fully conversant with the assessment criteria and regulations for report writing.
11. When constructing rose diagrams of 'dip' candidates should make it clear as to whether the diagram is of dip direction or strike direction (in which case strike direction and plus 180° should be shown). Dip angle is not usefully displayed on a rose diagram.

## Assessment

Many centres are to be congratulated on the accuracy of their assessment and the need for scaling is progressively being reduced. There were however some glaring examples of generous marking. In these cases a mark adjustment had to be applied in order to ensure comparable standards across all centres.

Overly generous marking was usually associated with inappropriate tasks which lacked focus or opportunity for sufficient data collection. Advice given at the task accreditation stage should prevent the recurrence of these problems.

A second cause of significant over-marking was a failure to recognise that candidates had not met some aspect of the assessment criteria, e.g. not planning an extension or not completing an evaluation. This can be avoided by careful reading of the specification and assessment criteria. No credit can be given for any criteria not met.

## Centre Support

Further guidance is available by contacting Jonathan Owen or Sarah Price at WJEC.

Jonathan Owen	<a href="mailto:jonathan.owen@wjec.co.uk">(jonathan.owen@wjec.co.uk)</a>
Sarah Price	<a href="mailto:sarah.price@wjec.co.uk">(sarah.price@wjec.co.uk)</a>



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