



GCSE EXAMINERS' REPORTS

GEOLOGY

SUMMER 2013

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. This will be available at:
<http://www.wjec.co.uk/index.php?nav=51>

GEOLOGY

General Certificate of Secondary Education

Summer 2013

Chief Examiner: 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. Candidates were not confused by the use of photographs of microscope thin sections and seemed to appreciate the greater accuracy and quality, compared with hand drawn sketches.

It is pleasing to report another successful year for centres and that the cohort included some exceptional candidates. This year's multiple choice questions were made a little harder in order to provide a more challenging test for the higher ability candidates. Candidates at the lower end of the ability range showed positive achievement and almost all gained a reasonable number of marks on each question.

General Advice

Questions should be read carefully, e.g. in Section 3 Q5 a number of candidates tried to explain the use of ammonites in determining latitude. It was evident that candidates found the extended writing more challenging than the other styles of questioning. Poor communication skills often detracted from the clarity of the answer. Candidates should be encouraged not to rush through multiple choice questions as all should be able to complete the examination well within the time limit.

As the majority of the paper is now machine marked it is not possible to make detailed comments about every question and the report will concentrate on those questions which were marked by examiners. Sections 1 and 3 proved to be the most challenging whilst Section 5 saw the highest facility factor.

Section 1

This section was relatively low scoring perhaps demonstrating that centres spend less time on map-work compared to the past when a 'practical paper' based on a map was part of the assessment.

- Q.4 Candidates had difficulty explaining why the fault was a strike-slip fault.
- Q.6 Many candidates made errors in the relative order of geological events which was a relatively straightforward sequence in comparison to the convoluted geological histories presented in previous years. Map-work is still an important part of the current 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.
- Q.10 Many candidates explained the origin of hydrothermal veins quite well but a number omitted some essential points. Some candidates had difficulty in producing a logically sequenced and cohesive account; some contradicted themselves or included erroneous statements.

Section 2

A generally well answered section. Candidates have a good knowledge of the rock cycle and are able to interpret textures of rocks in thin section with a high degree of skill.

- Q.14 This was structured with the intention of helping candidates identify a difference between ice- and water-transported sediment and then explain it. A lot of candidates ignored the line asking for the difference or stated it in very vague terms (e.g. *grain shape* instead of *grains in water are rounded and grains in ice are angular*) and then launched into the explanation. This was fine as long as the difference was explicit in the explanation.
- Q.19 Surprisingly a number of candidates did not identify rock E as foliated and the product of high pressure. Candidates also had difficulty explaining how the crystalline texture was produced by high temperatures. A large number of candidates selected site 2 which was clearly an igneous rock. Candidates who could explain why three of the sites were unsuitable and therefore site 1 was the only possibility were given credit.

Section 3

This was quite a low scoring section which is surprising given that fossils are traditionally familiar to all candidates.

- Q.2 It was hoped that candidates would suggest that the environment was shallow marine or lake but other interpretations were accepted provided the reasons were well justified. Surprisingly, most candidates concentrated on the ripple marks as evidence for their conclusions and ignored the dinosaur footprints. A good discussion of the environmental interpretation of ripples (be it symmetrical or asymmetrical) gained full marks.
- Q.3 Some candidates had a problem describing the shape of the suture line in words and a significant number thought F was the ammonite.
- Q.4 A wide range in quality of answers here. A number of candidates unsuccessfully tried to explain the order of the ammonites in terms of superposition, ignoring the suture line, whilst others could give a comprehensive description of ammonite evolution including the correct terminology and group names.
- Q.5 Inexplicably, some candidates tried to write an argument for ammonites being useful for determination of latitude. A whole selection of different fossil groups was suggested, including some that are so rare in the fossil record that their chances of discovery are virtually non-existent. Apart from corals, other fossil groups were accepted if fully justified and appropriate.

Section 4

A well answered section on plate tectonics.

- Q11 This proved to be a bit of a challenge although most candidates picked up a proportion of the marks. Most candidates realised that basalt is found at location 1 and andesite at location 4. The origin of basalt magma from partial melting of peridotite mantle (by decompression melting from some candidates although not expected) is generally well known. However explanations for the origin of andesite were much more variable and often ignored. Some candidates could suggest that melting of continental crust was involved. The main error was to suggest that andesitic magma is formed by melting of the subducting oceanic slab. Andesitic magma is produced by partial melting of the mantle wedge above the slab (due to the introduction of water from the slab) which is contaminated by sediments or continental crust or affected by fractional crystallisation (not expected in the answer). Candidates could still obtain full marks if errors were ignored but some answers were wide of the mark and generally described differences in viscosity and shape of volcanoes (a rehash of the specification).

Section 5

A very well answered section. Volcanic hazards are a popular topic and candidates are well briefed on the effects of earthquakes and volcanoes.

- Q.4 An attempt was made here to try and restrict candidates a little by concentrating on short term predictions. A few candidates did incorrectly mention historical records. Most candidates gained at least three marks with marks mainly being lost for inadequate descriptions of their chosen method (ground deformation, gas emissions, thermal monitoring or seismic activity).

Section 6

A generally well answered section. This section was based on some previously untested concepts such as mass extinction, the origin of life and the Cambrian explosion, which was well received by candidates.

- Q.9 Most candidates focussed on meteorite impact as a cause of mass extinction. The description could have gone on to discuss climate change as a consequence or the evidence for the impact.
- Q.11 A significant number of candidates misinterpreted the question and incorrectly described Darwin's Theory of Evolution. The better answers talked about the origin of life in hydrothermal pools or the introduction of life from extra-terrestrial sources. Other correct discussions revolved around the synthesis of organic chemicals in a reducing atmosphere or 'primordial soup'.
- Q.14 Most candidates could suggest at least two reasons for the preservation of life in the Burgess shale.

Section 7

A generally well answered section. Some of the geotechnical data was assessed for the first time but the data on landslides should have been familiar.

- Q3. Potentially this question was open to some very general and vague statements about the role of rock bolts and gabions. To obtain full marks candidates had to relate the engineering to the geological situation in the diagram e.g. *rock bolts prevent slippage along bedding planes which are dipping towards the road cutting and the gabions act as a retaining wall/add weight to the toe of the gravel preventing collapse of the road base.*

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.

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 activities was not entirely eradicated 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 2013. All should ensure that this form is submitted at least one month before the field work for the 2014 assessment is to be carried out.

Please bear the following points in mind when preparing future moderation samples.

- Please enclose a copy of Task Accreditation Form when the sample is sent to your moderator.
- 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 should be sent in the moderation sample, even though this may require the inclusion of work by candidates that do not appear on the list automatically generated on submission of the marks.
- Mark totals should be double-checked and great care taken to ensure that these are correctly entered into the online 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.

Option 1 Virtual Fieldwork

A small number of centres attempted this option. 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 2012 gained enough confidence to devise and carry out their own task this year. However it was disappointing that some centres reverted to Option 1 after completing fieldwork successfully in 2012. This seems to be a narrowing of candidates' experiences and opportunities.

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. Some centres used apparatus not allowed/specified in the instructions e.g. scales and Eureka cans to determine density. This equipment would not be available in the field. Rose diagrams were correctly drawn and roundness and sphericity of clasts 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 often on the generous side and it was felt that in order to justify the higher marks, candidates should have included most of the following:

- additional fully labelled field sketches
- measurement of dip angle at Locations 2 and 3
- sketch of graded bedding
- simple sedimentary log of Location 2
- sketches of fossils for identification purposes
- annotation of the photographs
- a summary geological history (in the form of a table)
- cross section of the map
- determination of downthrow side of the fault
- 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 Actual Fieldwork

There were some excellent field investigations seen. 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 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 were undertaken with a rough break down being investigations into:

- 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 range of opportunities given to candidates in areas of outstanding geology such as the Isle of Portland, Lulworth, Peak District, Wenlock Edge, Gullet Quarry, Bridgnorth, Shap, Cornwall, Traeth Bychan (Anglesey), Ingleton, Clevedon, Thurstaston (Wirral), Arran, Budleigh Salterton, Ogmere, Barry, Canary Islands, Crookdale Crag (A6 Shap), Salt Hill Quarry (Clitheroe), Millers Dale (Derbyshire), Shropshire, Black Mountains, Cudmore Grove (Essex), Prestatyn, Amroth, Marloes, West Angle Bay (Pembrokeshire), Isle of Man, Sussex Coast, Portishead, Kilve, Doniford Bay (all Somerset), Ballycastle (Northern Ireland) and Hunstanton. Other centres used a variety of local geological sites.

Centres are asked to take note of the following as a result of this year's submission.

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** as an **extension** of the centre planned 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. The field notes provide the basis for the report and are an essential part of the investigation. 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 normally be part of every investigation (where appropriate).
4. Some thought has to be given at the data collection 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.
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 fieldwork being carried out.

7. 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.
8. 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.
9. 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. 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.**
10. Centres using tuition at Field Studies Centres should make sure that staff are fully conversant with the assessment criteria and regulations for report writing.
11. Please take note of comments on your individual centre Moderator's Report and contact WJEC if further clarification is required.

Assessment

The majority of centres are to be congratulated on the accuracy of their assessment but some continue to have difficulty in this area. When centre marks are found to be out of tolerance they are adjusted accordingly. Adjustments become necessary for the following reasons.

- Awarding of marks on inappropriate tasks e.g. lack of focus for the investigation or lack of opportunity for the candidates to collect suitable data. Advice is given to centres at the Task 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. Centres need to be certain that there is written evidence for the marks awarded.
- Failure to recognise that candidates have not met some aspect of the assessment criteria, e.g. not planning an extension to an investigation already carried out or completing an evaluation. This can be avoided by careful reading of the specification. Any aspect of the criteria not completed should be given zero.
- Failure to show how criteria have been achieved by annotation of candidates' work. Accurate but brief annotation is beneficial to the candidates.

Support

Centres should be aware that there is help available from the WJEC. Moderators' Reports on the current moderation process should be downloaded from the secure website. Centres are urged to act on any recommendations in the Moderators' Reports.

The fieldwork proposal for Option 2 should be submitted to the subject officer Jonathan Owen (jonathan.owen@wjec.co.uk) at WJEC at least one month before undertaking the field work. Details of the specification can be downloaded from the WJEC website where the appropriate forms and guidance for teachers can also be found. Controlled Assessment Option 2 exemplars are available on the website.



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