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# **GCSE EXAMINERS' REPORTS**

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## **GEOLOGY**

## **SUMMER 2015**

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

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**GCSE GEOLOGY**  
**General Certificate of Secondary Education**  
**Summer 2015**  
**On-screen Examination**

*Principal Examiner:* Dr Alan Seago

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

It is pleasing to report another successful year for centres and that the cohort included some exceptional candidates. The candidates coped well with some difficult questions. The ability of the candidates seemed similar to that of last year. 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 Comments*

Candidates should pay particular attention to the scales on the axes of graphs (Figure 15 and Figure 17) and on diagrams (Figure 7). 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 responses and this was taken into account in Section 3 Q4 and Section 5 Q15. 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 3, 5 and 6 proved to be the most challenging whilst candidates achieved a high mean mark on Section 7.

*Section 1*

This was a question which tested the ability of candidates to interpret the landscape and their understanding of weathering and erosion processes. Some candidates certainly had difficulty identifying the correct terminology used in erosion (Q2). Those candidates who correctly associated the cavities in jointed limestone with chemical weathering (Q3) gained most of the marks for describing the process. Other candidates described freeze thaw or biological weathering.

*Section 2*

A wide ranging question based on the interpretation of structures and igneous activity on a geological map. 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 and thoroughly understood. Map-work remains an important part of the specification. 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. In Q1 the fourth and sixth options were commonly selected distractors. Compressional forces were commonly incorrectly inserted in the boxes for Q8. Q9 asked candidates to interpret the evidence for a sill or lava flow. Most merely repeated the labels on Figure 8 rather than explaining the evidence. Few candidates commented upon the lack of an upper baked margin. Many ignored the scale on Figure 7 describing the rock as gabbro and coarse grained, but almost all candidates could explain the variation in crystal size of igneous rocks as a function of cooling rate.

### *Section 3*

This was a question which required the environmental interpretation of sedimentary rocks, structures and fossils in an exposure. Most candidates could describe the textures and structures (Q3). Candidates found the interpretation of the energy conditions extremely challenging (Q4). Some could suggest an environment of deposition using the textures, such as flash flood for the conglomerate and shallow marine for the ripple marks, but could not put a coherent answer together to describe the changing energy conditions. In Q7 candidates rarely made use of all of the evidence available, although most could describe the environmental conditions typically attributed to corals.

### *Section 4*

This was based on the texture and origin of slate and events in the geological record. Candidates' general awareness of the times of important geological events was weak (Q1). Candidates had a good appreciation of the origin of slaty cleavage and its relationship to texture (Q3). Many candidates outlined the geological principles involved in landfill or reservoir construction (Q5) and scored good marks. Candidates who strayed away from these uses did struggle and began to talk incorrectly about leisure and tourism uses.

### *Section 5*

A wide ranging set of questions based on the origin of magnetic stripes at a constructive plate margin, the plate boundaries around Japan and the 2011 Japanese earthquake and resulting tsunami. Candidates found the calculation of spreading rate challenging (Q2). Candidates could describe one or two relevant points related to the origin of magnetic stripes (Q5) but few could put together a comprehensive and logical explanation of their formation and interpretation of their pattern. All of the options in Q7 provided useful distractors. A minority of candidates provided a full explanation of increase in tsunami height in shallow water (Q8). Most candidates could state two methods of reducing risk from earthquakes and tsunami (Q10) but fewer could provide a full description of the methods.

### *Section 6*

A question on some of the major events in the history of life: one of the major fossil finds in terms of the theory of evolution – *Archaeopteryx*; the K/T mass extinction event and fossil evidence for the drift of Britain across the equator to its present latitude. Conditions leading to exceptional preservation of fossils were well known by candidates (Q2). Candidates did not take enough care reading the scales on the axes of Figure 17 (Q5). Candidates did not make the links between the meteorite impact, the iridium-rich clay, climate change and mass extinction (Q7). Far too many candidates considered iridium to be radioactive and poisoning life. On the other hand, most candidates made the link between tropical plants and the northward drift of Britain. (Q9).

### *Section 7*

This section was mainly concerned with the geological suitability of a site for a reservoir and dam. Candidates had few problems with Q1-4. Good candidates gave detailed explanations for leakage under the dam involving both rock types and geological structures (permeable limestone, dip of bedding, faults). Other candidates described fewer reasons or just listed the problems with no explanation.

## GCSE GEOLOGY

### General Certificate of Secondary Education

Summer 2015

#### Controlled Internal Assessment

*Principal Moderator:* Dr Alan Seago

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. Work was submitted for moderation by 50 centres.

#### *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 was not entirely removed but this is now a problem at only a very small number of centres. However there is quite a turnover of centres with some centres submitting work one year and not the next and other centres submitting work for the first time - so that is a continuous requirement on the part of Moderators to ensure, as far as possible, that the work is of similar standard across the board.

Some centres did not complete a Task Accreditation Form (Option 2) for 2015. All centres should ensure that this form is submitted at least one month before the field work for the 2016 assessment is to be carried out.

The following points are emphasised:

- Please enclose a copy of the 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 options must be included in the moderation sample, even though this may require more than 10 candidates' work to be 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 field notes with candidates' name and centre number as they are often separated from reports in transit.

## 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 2014 gained enough confidence to devise and carry out their own task this year.

Candidates handled the data efficiently and logically and demonstrated some good geological skills. 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 of dyke orientation was accurately drawn in the main. Planning an extension is particularly challenging for candidates who attempt this option and only those with some degree of field experience succeeded.

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:

### Field notes

- locality 1 labelled sketch of graptolite *Didymograptus*
- locality 2 hydrothermal vein in limestone - description of galena specimen B
- labelled field sketch of unconformity locality 3 photograph 2
- measurement of dip angles of lower beds at location 3
- labelled field sketch of faulting locality 4 photograph 3
- graphic log of locality 4
- locality 5 description of conglomerate specimen C
- labelled field sketch of columnar jointing locality 6 photograph 4
- description of specimen D quartz-feldspar-porphyry locality 6
- description of specimen E garnet-mica-schist locality 7
- locality 8 measurement of orientation of dykes inserted in table 1

### Report

- annotated photographs
- graphic log of locality 4
- development of an unconformity - folding
- faulting - normal, 1m throw, rift structure
- lava flow/columnar jointing/porphyritic texture - two rates of cooling
- locality 8 rose diagram of dykes in table 1
- interpretation of locality 8 rose diagram of dykes
- type of mineralisation
- cross section of map
- interpretation of changing geological environments from fossils/rocks/data
  - graptolite *Didymograptus* shale fine grained low energy/age
  - limestone
  - red sandstone
  - conglomerate
  - breccia with regional metamorphic clasts
  - igneous history dykes (trend) and lava flow
- geological history table summary
  - deposition mudstone shale limestone red sandstone
  - folding
  - dyke
  - uplift erosion unconformity

- deposition sandstone conglomerate breccia lava flow
- tilting
- marine erosion
- 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, which are being perfected by the centres and well suited to the specification. 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 mixture of field tasks was 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 variety of opportunities given to candidates in areas of outstanding geology such as Purbeck, Lulworth, Peak District, Eastbourne, Gullet Quarry, Bridgnorth, Shap, Bude, Traeth Bychan (Anglesey), Clevedon, Arran, Ogmores, Wirral, Barry, Crookdale Crag (A6 Shap), Castleton, Blackstone Edge, Broad Haven Pembrokeshire, Marloes Sands Pembrokeshire, West Angle Pembrokeshire, Shropshire, Black Mountains, Amroth Pembrokeshire, Portishead, Ballycastle (Northern Ireland), Budleigh Salterton, Forest of Dean, Woolhope, Holmfirth, Lindisfarne and Walton on the Naze. Other centres used a variety of local geological locations.

Centres need 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. In some cases, 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. Some candidates had little or no data in the field notes yet were able to produce lots of data in a report. The field notes provide the basis for the report and are an essential part of the investigation.

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.
4. Some thought has to be given at the planning stage as to whether the data to be 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. 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 using tuition 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.
12. Candidates who are absent for the data collection phase of the *Option 2* task should complete *Option 1*. They must not be given data collected by others in order to complete a report.

### *Assessment*

Many centres are to be congratulated on the accuracy of their assessment but some examples of significant over-marking were seen. In these cases mark adjustments were applied. Problems arose in the following circumstances.

- Marks awarded for inappropriate tasks e.g. lack of focus for the investigation or lack of opportunity for candidates to collect suitable data. Advice given to centres at the Task Accreditation stage should prevent these issues from arising.

- 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 not completing an evaluation. This can be avoided by careful reading of the specification. No marks can be awarded for any aspect of the criteria not completed.

### *Support*

The Moderators are always willing to provide as much support as is requested by the centre. Centres should be aware that there is help available from the WJEC. Published exemplars of coursework investigations are available on the WJEC website. Centre Moderator's Reports should be downloaded from the WJEC secure website. Centres are urged to act on any recommendations made therein.

The fieldwork proposal for Option 2 should be submitted to the subject officer Jonathan Owen ([jonathan.owen@wjec.co.uk](mailto: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. For further support contact Jonathan Owen or the subject support officer at WJEC ([sarah.price@wjec.co.uk](mailto:sarah.price@wjec.co.uk)).



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