GCSE EXAMINERS' REPORTS

GCSE GEOLOGY

SUMMER 2023

Introduction

Our Principal examiners' reports offer valuable feedback on the recent assessment series. They are written by our Principal Examiners and Principal Moderators after the completion of marking and moderation, and detail how candidates have performed.

This report offers an overall summary of candidates' performance, including the assessment objectives/skills/topics/themes being tested, and highlights the characteristics of successful performance and where performance could be improved. It goes on to look in detail at each question/section of each component, pinpointing aspects that proved challenging to some candidates and suggesting some reasons as to why that might be.[i]

The information found in this report can provide invaluable insight for practitioners to support their teaching and learning activity. We would also encourage practitioners to share this document – in its entirety or in part – with their learners to help with exam preparation, to understand how to avoid pitfalls and to add to their revision toolbox.

Further support

Document	Description	Link
Professional Learning / CPD	Eduqas offers an extensive annual programme of online and face-to-face Professional Learning events. Access interactive feedback, review example candidate responses, gain practical ideas for the classroom and put questions to our dedicated team by registering for one of our events here.	https://www.eduqas.co.uk/home/professional-learning/
Past papers	Access the bank of past papers for this qualification, including the most recent assessments. Please note that we do not make past papers available on the public website until 6 months after the examination.	www.wjecservices.co.uk or on the Eduqas subject page
Grade boundary information	Grade boundaries are the minimum number of marks needed to achieve each grade. For unitised specifications grade boundaries are expressed on a Uniform Mark Scale (UMS). UMS grade boundaries remain the same every year as the range of UMS mark percentages allocated to a particular grade does not change. UMS grade boundaries are published at overall subject and unit level. For linear specifications, a single grade is awarded for the overall subject, rather than for each component that contributes towards the overall grade. Grade boundaries are published on results day.	For unitised specifications click here: Results and Grade Boundaries (eduqas.co.uk)

Exam 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.	www.wjecservices.co.uk
Classroom Resources	Access our extensive range of FREE classroom resources, including blended learning materials, exam walk-throughs and knowledge organisers to support teaching and learning.	https://resources.eduqas.co.uk/
Bank of Professional Learning materials	Access our bank of Professional Learning materials from previous events from our secure website and additional pre-recorded materials available in the public domain.	www.wjecservices.co.uk or on the Eduqas subject page.
Become an examiner with WJEC / Eduqas.	We are always looking to recruit new examiners or moderators. These opportunities can provide you with invaluable insight into the assessment process, enhance your skill set, increase your understanding of your subject and inform your teaching.	Exam Marking jobs | Examiner & Moderator Vacancies From Eduqas

Subject Officer's Executive Summary

Each of the two components had the same structure as in previous years, and there were no particular issues with candidates' interpreting the papers.

Component 1 was slightly more accessible than Component 2, which was a very similar standard to that of previous years.

Questions assessing mathematical skills were generally better answered than in previous years. The responses to extended writing QER questions generally scored more highly than in the past. The candidates showed more confidence in tackling a map completion question in Component 2 than when this style of question had been asked a few years ago.

Areas for improvement	Classroom resources	Brief description of resource
Deposition of turbidites	**SEDIMENTARY ROCKS AND THEIR FOSSIL CONTENT**	knowledge organiser
Cephalopod identification	**GEOCHRONOLOGICAL PRINCIPLES**	knowledge organiser

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COMPONENT 1 – GEOLOGICAL PRINCIPLES

Overview of the Component

Component 1 covered specification aspects of structural geology, sedimentology, plate tectonics, earthquake hazards, engineering geology and palaeontology along with appropriate practical and mathematical skills.

Component 1 was very accessible to the majority of candidates and there were pleasingly few questions that were not attempted compared to previous examinations and resulted in a very wide spread of marks from 0 to 80/80. The mean for the paper was 50.8/80 up from 46.1/80 in Summer 2022. The Facility factor of the six questions ranged from 60.2 (Q.6) to 76.1 (Q.1)

A small number of candidates failed to make use of the data sheet as instructed and sacrificed easily obtainable marks.

A minority of candidates failed to tick two boxes on the multiple choice questions when required.

The QER extended response questions were better answered than in previous examinations and the higher scoring candidates accessed maximum marks here.

The mathematically based questions were answered better than in previous examinations and very few candidates made no attempt at them.

Comments on individual questions/sections

Question 1 Facility factor 76.1
This was generally well answered by many candidates and had the highest facility factor of the six questions. Lower scoring candidates lost marks in estimating the height of the cliff and when stating the era and period to which the geological formations belonged. A small number of candidates quoted numbers in Ma rather than eras and periods. Most candidates correctly identified Boundary B as an unconformity but failed to describe the geological processes that had taken place between the deposition of the Brejeira Formation and the Gres de Silves Formation. The majority of candidates described the depositional environment of the desert sandstone to good effect but the turbidite/greywacke was much more poorly answered by many candidates. Common incorrect answers referred to rivers and swamps as environments of deposition.

Question 2 Facility factor 61.7
A straightforward question on the plate tectonic setting of Montserrat in the Caribbean with only two extended responses required from candidates. Identifying the type of plate margin was poorly answered with more than half the candidates selecting the incorrect answer. Many candidates simply named a mechanism responsible for driving plate movements in part (c) rather than describing how it worked, resulting in a maximum of just 1 mark. The most common answers were convection currents, slab pull/drag and ridge push. A minority of candidates suggested continental drift. The heat flow question in part (e) was well answered by over half of the candidates by referring to Figure 2 and linking the high value to rising magma and the low value to the ocean trench/subduction. Weaker answers identified rising magma below Montserrat, but failed to account for the low value at location C.

Question 3 Facility factor 70.0
A very accessible question for the majority of candidates on the 1960 Valdivia earthquake and its resultant tsunami. Most candidates found section (a) very straightforward and scored full marks. The most common mistake was dividing 12 instead of 22 into 17,320, thereby losing 1 mark. Error carried forward still gave credit for the correct answer using the wrong values. Section (b) (ii) was a good discriminator but was the most poorly answered part of question 3. Weaker answers cited distance from the shore 640 km as the reason it did not generate a tsunami, ignoring the type of fault. Section (b) (iii) was well answered by the majority of candidates Answers needed to address two elements, firstly comparing the two events using the data from Table 1, then secondly explaining the reasons for the difference in the numbers of deaths. Virtually all candidates picked up marks by comparing the events using the data in Table 1, however a significant number of lower scoring responses failed to address the reasons for the differences in deaths. Many answers were quite generalised and vague and tried to use the data from Table 1 to explain the differences for example the Indonesian event was 3 km shallower. These candidates were unable to suggest level of development, population density, evacuation plans, education and preparedness etc.

Question 4 Facility factor 71.9
A very accessible question on engineering geology and the Channel Tunnel with only two extended responses required from candidates. The lowest scoring part of this question was (a) (iv) as many candidates failed to identify the two most likely survey methods used to plan the route of the Channel Tunnel. It was pleasing to see that the majority of candidates had little difficulty in calculating the cost of the tunnel per metre in part (b). Section (c) was a good discriminator and produced a wide range of answers. Most candidates scoring full marks referred to the fault, its possible reactivation, water entering and flooding and change in level of the tunnel. Weak answers failed to notice the fault and concentrated on the different rock types, some of which might have been more difficult to drill through.

Question 5 Facility factor 60.9
Generally, a well answered question on palaeontology based on four photographs all with different scales. The majority of candidates correctly identified the four fossil photographs but the most common errors were Figure 5a being identified as a graptolite from the Silurian and Figure 5d identified as a fossil of an early hominid. Question (a) (iv) produced a very polarised set of responses with candidates often scoring either 0/2 or 2/2. Many candidates failed to appreciate that millions of footprints could be produced by a single organism and they would not rot/be scavenged/destroyed by predators.

Section (b) was the second 6 mark QER question and required an extended response. This question was lower scoring than the other QER question with a mean mark of 2.6/6.This question required candidates to evaluate two separate phrases, firstly that the fossil record is largely complete and secondly that the fossil record is biased in favour of marine organisms. Only the higher achieving candidates evaluated both phrases, many simply concentrated on just one of the phrases and consequently limited the marks they could be awarded. A small number of candidates tried to answer the question just based on the four fossil photographs at the start of the question. The weakest candidates simply agreed with both phrases. The strongest answers referred to an absence of soft-bodied organisms in the fossil record and the low preservation potential of terrestrial organisms suggesting the fossil record is incomplete. Marine bias was acknowledged as many organisms had shells/hard parts and lived in an environment where sediment was being deposited.

Question 6 Facility factor 60.2

A seemingly straightforward question based on a cliff section showing igneous, sedimentary and metamorphic rocks but this question had the lowest facility factor. The dip direction and strike direction question (a) (i) was answered incorrectly by a significant number of candidates, with some candidates just measuring the dip angle and leaving the strike direction blank. Most candidates correctly calculated 4% for mineral J in part (b) (i) and also correctly identified it as mica in (b) (ii). However, the answers in (b) (ii) saw many candidates contradicting themselves by stating rock H had fine and coarse crystals or it formed by two stages of cooling and by very slow cooling. It seems that many candidates did not appreciate the 1mm scale bar on the left side of figure 6b. Only 30.5% of candidates managed to correctly identify rock H as basalt with all the other four options being used as answers by the majority of candidates. The final question 6 (c) produced many excellent answers with a significant number of answers scoring maximum marks but the mean mark for this question was only 2.1/4. Many candidates recognised that rock H was a sill as it was concordant and that the cross-section must be inverted due to the limestone fragments in the conglomerate. Far fewer candidates referred to the schist, a regional metamorphic rock being on top of un-metamorphosed sediments. The lower scoring candidates simply agreed with both statements but failed to give supporting evidence for their evaluation.

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COMPONENT 2 – INVESTIGATIVE GEOLOGY

Overview of the Component

The Component 2 paper included short and extended questions based on Map 1. Component 2 is an investigative paper that requires candidates to use practical skills and techniques listed in Appendix B in the specification. Maths skills were also assessed in the paper and accounted for 24 marks.

The paper tested a wide range of topics with an emphasis on the rock groups, minerals, fossils and structural geology. Many questions required the candidates to identify specific rocks, fossils, fold and fault types. Candidates were tested on the sketching of a conglomerate, a synform and an ammonite suture line. They were also tested on the construction of a graphic log, completion of a partially constructed geological map and the dip and strike elements of beds, folds and an igneous body. Candidates were also assessed on the plotting of grid references.

Question 4 which focused on mineral tests and density, was the highest scoring question. As expected, question 1 was one of the lowest scoring questions as this included the 6 mark QER question. Question 7 was also low scoring, with many candidates unable to correctly identify the cephalopods and the type of fault. Overall, the question paper performed similarly to previous series.

Comments on individual questions/sections

Question 1
Overall, a good starter question, with many candidates successfully accessing the sub-questions. Most candidates were able to correctly identify augite. Good responses for the texture description included porphyritic, groundmass and phenocrysts. Many candidates used the figure to measure the size of the crystals however, many used sedimentary texture terms.

Most candidates scored 1 or 2 on section (a)(iii) which required a reference to the size of the phenocrysts and groundmass. Only a few candidates referred to the depth of cooling and the order of crystallisation. A wide range of igneous rocks were named in section (a) (iv), with the majority of answers being granite. Igneous rocks not in the specification were also used e.g. diorite, gabbro, and dolerite. Section B was answered well with many candidates correctly identifying the columnar jointing. Many correctly measured the size of the column and were able to describe and interpret the relationship between the columns and the igneous body thickness.

The 6-mark QER question continued to be a very good discriminator. Many candidates referred to the figures and the map. Candidates who structured their answer using paragraphs for each figure and then evaluated their statements achieved high marks. he map evidence for a dyke was used very well and many recognised that columnar jointing does not generally form in plutons. Only a few candidates were able to refer to the crystal size of Rock Unit A, as many thought it was a coarse crystalline rock. Lower scoring candidates simply stated the presence of a recrystallised zone and included fragments in Figure 1d without explaining why they were evidence for a pluton.

Question 2
This was a very accessible question. The majority of candidates were able to recognise that Rock Unit B was a contact metamorphic rock that formed from the recrystallisation of limestone. Many candidates used the scale bar to measure the correct size of the crystals and were able to identify the rock as marble, although as expected some candidates identified the rock as limestone or metaquartzite.

Question 3
The question differentiated well. Many candidates were able to identify the fold and dip angle; the most common error seen was stating one direction for the strike. The majority of candidates attempted the incomplete map, however few candidates accurately plotted the grid reference. Many candidates were able to plot the sill with an E-W strike, to the correct thickness and demonstrate that it was older that Rock Unit F. Only a few understood that folds with equal dip would have the same outcrop width on the map.

Question 4
This question was the highest scoring with many candidates achieving full marks. The mineral tests question was answered well, however the description of the lustre test was confused by some. Common incorrect answers described the test as ‘shining a light on the mineral’. Most candidates were able to rearrange the density equation to calculate the volume, however some incorrectly rearranged of the equation as v=m/d.

Question 5
The sketch was generally of a good quality. Most candidates sketched a synform with the correct number of beds at the correct dip angle. Higher scoring candidates accurately sketched bed thickness and included joints and laminations. Many achieved the marks for recognising that both folds were synforms in section (b), however many incorrectly described the folds as symmetrical due to equal dip angles. Higher scoring candidates included values of dip when stating the difference between the folds.

Question 6
Many candidates were able to accurately plot the graphic log. A small number of candidates plotted beds as boxes for which no credit could be awarded. Sketching the mean grain size of the conglomerate proved to be a challenge for many candidates. Most did not take into account a mean grain size of 5mm, and the grains were drawn 5mm and under. High scoring candidates sketched a range of grain sizes and often labelled the finer grains as the matrix. When interpreting the grain size and energy of deposition many thought that Bed 1 indicated a higher energy due to the grains being eroded and therefore resulting in finer grains. In section (d) many recognised that a trilobite indicated a marine environment however some candidates thought that shale only formed in a marine environment and did not link this to low energy conditions.

Question 7
Overall, this was a lower scoring question, with many candidates not able to identify the cephalopods and not accurately sketching the frilly suture. Despite many candidates incorrectly identifying the ammonite and ceratite, they understood the relative ages of both and were able to achieve marks for section (c). High scoring candidates recognised that the older rocks are on the upthrown side and were able to correctly define a normal fault.

Practical Skills

Map Skills:
There was a much-improved understanding of strike direction from a map and the identification of the fold type. Many more candidates attempted the incomplete map than when it had been previously assessed, and so achieved marks.

Sketching skills:
The quality of the sketching was good, however candidates need to accurately sketch the smaller details. e.g. change in bed thickness and suture pattern.
When sketching rocks, the scale bar should be used to accurately draw grains and crystals. Mean grain size should be taken into account. When drawing sedimentary rocks, the grains should be touching and if the rock is poorly sorted, a wide range of grain sizes should be drawn.

Describing textures:
Many candidates are still confusing texture terms using them with the incorrect rock group, most commonly using sedimentary terms in igneous descriptions. More candidates are now measuring the size of crystals and grains.

Identification of rocks and fossils:
It was notable that candidates are using rocks and fossil groups not on the specification and are losing a significant number of marks. For example, gabbro, dolerite, diorite and identifying an ammonite as an ammonoid.

Supporting you

Useful contacts and links

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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

[i] ***Please note that where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.***