GCSE EXAMINERS' REPORTS

GEOLOGY
GCSE

SUMMER 2022

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COMPONENT 1: GEOLOGICAL PRINCIPLES

General Comments

The examination was fully completed by the majority of candidates in the 1 hour 15-minute time allocation. Only a very small number of candidates ran out of time and failed to complete either the last part or the whole of question 7.

Most questions were attempted by the cohort and in general very few questions had no responses.

A small number of candidates stated they could not measure distances or angles accurately as they did not have access to a ruler or protractor. The requirement for a protractor and ruler is clearly stated on the front page of the examination paper.

Overall, the quality of responses on the mathematical based questions was poor by a significant number of candidates.

Multiple choice questions which required two boxes to be ticked had only one box ticked by a significant number of candidates.

The extended responses to questions 4 (c), 5 (b) and 6 (b) were disappointing overall and the answers were far too brief from many candidates. Additionally, candidates often simply described and failed to explain in their answers.

Comments on individual questions/sections

Q.1 Overall a good starter question with many candidates scoring highly, particularly on b (i) where Archaeopteryx was used to explain the link between reptiles and birds in the fossil record. A number of candidates appeared to be confused by 'hominids' in (a) (i) not realising it referred to humans and the great apes.

Q.2 A challenging question which required careful reading of two graphs with quite complex scales. Only the highest achieving candidates scored well here, with many failing to score on (a) (ii) and (b) (ii). A large number of candidates failed to cite buoyancy/low density of the oil to explain why it would rise from depth.

Q.3 Generally a well answered question accessible to the vast majority of candidates. The calculation in (b) (ii) was the best answered mathematical based question on the whole paper. The majority of candidates scored 2 or 3 on (b) (iii) as they had good knowledge of carbon capture and storage. A mark was often not gained due to candidates not stating that the carbon dioxide had to be converted into a liquid or solid state before being stored underground in depleted gas/oil fields.

Q.4 Although the question starts with a lengthy and quite complex explanation of a jelly lava flow experiment, most candidates performed well here. Completion of **Table 2** in particular was very well answered with many candidates scoring 3/3. Section (c) was the best answered extended response on the paper with many of the highest achieving candidates gaining full marks. Lower scoring candidates tended to concentrate simply on viscosity in a descriptive sense, relating it to the shape of the volcanoes. Quality answers included reference to high silica/silicic magma trapping gases leading to a build-up of pressure and a violent eruption, whilst low silica/mafic magma allow gases to escape and lead to passive eruptions.

Q.5 An accessible question on the continental drift of the UK from the Carboniferous to the Quaternary. Higher achieving candidates scored well here, but others scored quite poorly, particularly on the extended response in 5 (b). Many simply copied the information below **Figures 5b**, **5c** and **5d** and linked this to Britain's latitude at the time from the graph in **Figure 5a**. Only the stronger candidates explained how the rock characteristics provided evidence of the climate, for example the angular grains and poor sorting of the till were linked to glacial abrasion, plucking and attrition due to transport and deposition by ice. Only a few candidates referred to the progressive drift northwards of Britain during this time. It was surprising to see more than half of the candidates answer (a) (ii) incorrectly, giving Carboniferous as the answer instead of Palaeozoic.

Q.6 A seemingly straightforward question that generated very variable responses. Many candidates struggled with the crater circumference calculation even though the simple formula was given. Values ranged from tens of kilometres to millions of kilometres. The diameter was 5 x the width of the scale bar so 2500/2 to achieve a radius of 1250 km. Section (a) (iii) on the cross-cutting relationships was answered correctly, scoring 3/3, by the majority of candidates. Section (b) responses were rather disappointing both in terms of length and detail. This was a 4-mark question, yet many candidates only wrote a single sentence, often just stating that bacteria could have been carried to Earth on meteorites. It was surprising how few candidates referred to the K-Pg mass extinction, the extinction of the dinosaurs due to impact hazards such as global cooling/warming, acid rain, tsunamis and wildfires, followed by the rise of mammals and birds to take over the ecological niches.

Q.7 A testing final question on plate tectonics that generated answers of very variable quality, with the weaker candidates scoring relatively few marks particularly on (b) (iii) and (d). A few candidates ran out of time and failed to answer all of question 7. In (b) (ii) many candidates ticked two types of faults or two types of stress in the hope of gaining one mark. Section (b) (iv) which required the completion of **Table 3** was a struggle for many candidates. Most candidates scored 1 or 2 on section (c) which required foliation/slaty cleavage as the reserved mark. Section (d) was the most testing question on the paper and only very able candidates scored well here.

Summary of key points

- Candidates should be fully au-fait with the Data Sheet and how it can be used to answer questions from certain parts of the specification on the examination paper.

- Candidates should be aware that a protractor and ruler are required to be taken into the examination. A calculator is provided in this on-screen exam but candidates may prefer to use their own.

- Candidates should read the questions carefully, particularly the words in bold face, which should lead them to a particular line of response. (Era/Period confusion on Q5 (a) (ii) for example)

- Regarding multiple choice questions, candidates should be aware that two ticks are required in some questions. The general rule is that 5 options require one tick box, 6 options require 2 tick boxes.

- Candidates should understand that scale bars match whatever is being measured in multiples typically of 1, 2, 3 ,4 or 5 so that the answer is a round number such as 1250, rather than 1039.65.

- Candidates should write at length on the QER responses which are worth 6 marks and should use the data/information in the stimulus materials to scaffold their answers. Candidates should not just describe but also explain their answers when asked.

- Candidates should read their answers through carefully and check that any rubric errors have not been made once they have completed the paper.

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COMPONENT 2: INVESTIGATIVE GEOLOGY

General Comments

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. Mathematical skills were also assessed in the paper and accounted for 14 marks.

The paper tested a wide range of topics with an emphasis on the rock groups, minerals, fossils and structural geology. It was noticeable that many of the candidates found the mapwork questions quite challenging, particularly recording strike measurements and completing the cross-section of faulted rocks. Many more candidates attempted the cross-section than in previous examination series and were able to successfully plot the dip amount and direction of the beds and the fault.

Similarly, many more candidates attempted the QER question. It was evident that candidates had a good understanding of how oolitic limestone forms and the environmental conditions required for the growth of corals. Successful candidates related their answer to the figures and the points in the stem of the question.

Many candidates were able to successfully plot both graphs and sketching was of a good standard. Mineral testing and identification were also done well.

Comments on individual questions/sections

Q.1 (a) Many candidates correctly identified the mineral, rock group and name of the rock. The most common error was the inability to identify the equicrystalline texture, and many candidates did not put any answer alongside that bullet point.

(b) Overall candidates correctly plotted the graph. However, many candidates described the change in crystal size rather than explaining the change, related to rate of cooling and location in the intrusion.

(c) The candidates correctly identified the pluton using evidence from the map. Pleasingly, many candidates evaluated both parts of the question.

(d) Almost all candidates stated that Rock Unit A was younger than Rock Unit B. Higher scoring candidates referred to Law of Included Fragments and some used the term xenolith.

Q.2 (a) Overall, this question was answered very well. Most candidates correctly identified calcite as the main mineral forming Rock Unit B and many achieved full marks for describing the texture.

(b) This was a very accessible question with the majority of candidates achieving full marks for the scaled drawing of the coral. A variety of standards of accuracy were seen in the drawing of the coral with the most common error being the omission of the drawing of internal detail.

(c) Many candidates correctly identified the coral.

(d) The extended response [QER] question continued to be a very good discriminator. The quality of the responses was much improved from previous years. To access the higher band marks, candidates were required to refer to both Figures 2a and 2b and each of the four points in the question. Many candidates were very knowledgeable about the environmental conditions required for coral growth and the formation of oolitic limestone. Candidates who structured their answer using paragraphs and evaluated each of the points (cold, low energy, shallow and marine environment) in a separate paragraph, scored highly.

Poor answers were characterised by candidates repeating the question in the answer and simply stating that 'oolitic limestone and coral formed in shallow marine environment' without linking the evidence to an explanation.

(e) Many candidates recognised that the limestone had been metamorphosed to marble. There was regular use of the term recrystallisation. However, many were not able to state that the rock had undergone contact metamorphism.

Q.3 (a) This question proved accessible to most candidates. Some incorrectly identified the mineral as garnet. However, many correctly named and stated the results of the tests and identified haematite.

(b) Many candidates incorrectly identified the mineral as garnet, with the higher achieving candidates recognising that quartz often forms as a gangue mineral in hydrothermal veins.

(c) Many candidates calculated the ratio of gangue to ore. The most common error was to calculate the ratio of ore to the total mineral deposit, rather than the ratio of gangue to ore.

(d) The majority of candidates made the link between the hydrothermal vein and the fault. However few then went on to explain the formation of the minerals in the vein. Generally, part (ii) was answered poorly with very few candidates describing magnetic surveys or ground penetrating radar.

(e) Nearly all candidates linked uranium to energy generation. However, many incorrectly chose carbon sequestration as the most appropriate use for limestone.

Q.4 (a) Overall, this question scored highly. The best answers showed accurate sketches, illustrating the cross-cutting relationships of the vein, undertaken without the use of a ruler.

(b) This was also answered very well, with many candidates achieving full marks.

Q.5 (a) Many candidates stated the correct dip direction, but the strike was more problematic with many stating just one direction.

(b) The cross-section proved to be a good discriminator with a wide range in the quality of responses. In most cases the correct bed dip angle was plotted. The most common errors were related to plotting of the bed dip direction and the fault dip direction and amount. A small number of candidates drew beds vertically for which no credit could be awarded.

(c) Many candidates correctly stated the type of stress and gave a reason using the appropriate terminology.

Q.6 (a) Many candidates stated the grain size and shape of the texture of bed 1 and correctly state the number of grains with a N-S orientation. A number of candidates added up both the N and S segments.

(b) A wide range of responses was seen on this question. High scoring candidates recognised that the majority of grains were in a N-S orientation and that the river could have flowed from the north or the south. Many candidates were able to link the coarse grain size to a high energy river, and rounded grains to erosion.

(c) Nearly all candidates correctly plotted the bar chart and described the sorting of bed 2. A variety of standards of accuracy were seen in the drawing of the bars. Candidates should draw bar charts with a ruler.

(d) This question differentiated well. Most candidates recognised the significance of cross-bedding and rounded grains with regard to wind transport. High scoring candidates stated the size of the grains and recognised that medium-sized grains can be transported by wind.

Q.7 This question differentiated very well. High scoring candidates recognised the relative permeability of shale and limestone and discussed the impact this would have if an impermeable barrier should fail. The better answers also referred to the effects of the synform and the faults on the movement of polluted groundwater. Few candidates referred to leachate in their answer and very few compared the potential risk between the two sites.

Summary of key points

- Candidates should become accustomed to sketching free hand without the use of a ruler.
- There is evidence that candidates are not fully scrutinising the data provided in tables, diagrams, photographs, and graphs when completing their answers.
- Candidates who pay attention to command words in the questions, such as describe, explain, compare, and evaluate gain more marks than those who do not.
- Candidates should ensure that they have completed filling in tables where each bullet point provides space for an answer.
- Extended writing questions are often provided with a structure. These can be used by candidates to help them to structure their answers.

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