OCR
Oxford Cambridge and RSA

GCE

Geology

Advanced GCE **A2 H487**

Advanced Subsidiary GCE **AS H087**

OCR Report to Centres June 2014

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

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OCR REPORT TO CENTRES

F791 Global Tectonics

General Comments

Candidates were generally well prepared so performed well. Candidates still misinterpret the extended prose on evidence for sea floor spreading as being about evidence for continental drift. Many strong candidates missed a number of marks for this reason. Candidates found it difficult explaining in detail why fault sections move at different rates or how earthquake waves are produced.

Candidates continue to show that they understand how seismic waves can be used as evidence for the structure of the Earth.

There was little evidence of candidates running out of time; a few candidates had very brief answers to question 5, the extended prose question, which may link to lack of time. Very few candidates missed out part questions, which is encouraging. However, some missed out question 2b, which although a straight forward plotting question was presumably missed as the candidate did not see the question as there are no answer lines below.

Comments on Individual Questions

Q1 Candidates showed an impressive knowledge of the use of seismic waves as evidence for the structure of the Earth. Candidates did find recognising the layers of the Earth from their chemistry more difficult. This was the easiest question on the paper and discriminated well.

a Many candidates knew that radiometric dating is the main method used for determining the age of the Earth. Very few gave specific examples such as U/Pb, Rb/Sr or K/Ar. A number of candidates gave Carbon dating as the method and although this is an example of radiometric dating, the half-life is too short to be of use with rocks.

b i Most candidates were able to plot the points accurately (within half a grid square). Some candidates' plotting was scruffy and candidates should be strongly encouraged to take more time and care over the plotting so that it is accurate and neat. The same goes for the line graph, which should be a neat line. A few candidates lost this mark by allowing the curve to go above the 7.0 which is the maximum velocity plotted.

b ii Most candidates successfully located the Gutenberg Discontinuity at2900 km, the boundary between the mantle and the outer core. Candidates do need to make sure that label arrow actually touches the correct location on the graph precisely rather than being vaguely in the correct position. Very few candidates placed the arrow at the outer core inner core boundary.

b iii Most candidates recognised that the P wave velocity drops at 100 km, although fewer could explain that it was to do with passing through the partially molten asthenosphere. Many candidates thought this was the crust, lithosphere, mantle rather than the asthenosphere. A significant number of candidates stated that the waves fluctuated which is not the correct term to use in this context. The best answers showed a strong link between description and explanation.

b iv Candidates had an impressive knowledge of the behaviour of S waves as they encounter the core. Most wrote clear explanations about why the S waves stopped at the mantle/outer core and were regenerated in the inner core by P waves. A minority did not

differentiate between the outer and inner core and just called it the core; this made it impossible to gain full marks.

c i This was a new style of question, asking the students to identify the layers of the Earth by looking at their chemistry. Nearly half the candidates were able to match all of the layers successfully. Of the remainder of candidates, most recognised that the core was iron and nickel rich. The most common error was mixing up the mantle and oceanic crust, which is understandable.

c ii Many candidates successfully stated that the composition of iron/metallic meteorites are a good source of indirect evidence for the composition of the core. Fewer candidates mentioned the earth's density, gravity field or magnetic field. Common errors included just writing meteorites without being specific; some just said gravity or magnetic field or density without linking it to the Earth.

Q2 Candidates showed a sound knowledge of earthquake related terms and the reasons for radon increase prior to some earthquakes. Candidates did find explaining the variation of movement along a fault difficult. The question has sections with a range of difficulties, which led to this question being excellent for differentiating candidates.

a Candidates are usually good at linking definitions to terms and this was certainly the case with earthquake related terms. The majority linked all the definitions successfully. Common errors were between the pairs: seismometer/seismogram, epicentre/focus and intensity/magnitude.

b i Most candidates located the possible timing of the earthquake around the point where radon levels drop at around 9 months. Candidates could label just before or up to 9.5 months. The point raised in **1 b ii** about precision of the placing of labelling arrows also holds true in this context.

b ii A majority of candidates knew that radon can escape from micro-cracks prior to an earthquake. Many candidates also provided very detailed explanations linking the micro-cracks to stresses building up in the rocks. Others gave extra detail such as granites often being the source of the radon. It is important in questions about earthquake prediction using possible precursors that candidates know the effect and can explain why it occurs. Many candidates in this radon example did this successfully.

c Although most candidates knew the name of a method for measuring changes in ground level only a minority could actually explain how these methods worked. The most successful answers linked tiltmeters to change in angles of slopes. Candidates needed to link other methods to changes in angle or distance between two points. Weaker answers gave the name of the technique but then just repeated the wording in the question. Candidates need to give full explanations of how the named techniques actually work.

d i It was impressive how many candidates knew the type of fault exhibited by the San Andreas fault (tear, transform, strike slip). A number of candidates answered conservative, which is the type of plate margin but not a fault type. Other errors included shear, normal or reverse.

d ii Explaining why different sections of a fault move at different rates proved difficult for many candidates with most gaining 1 mark at best. Candidates need to be clear that some parts will move regularly (and so do not store up much strain energy) and others stick (so strain energy builds). It can be linked to rock type and friction, which will lead to varying amounts of stored strain energy.

d iii Recognising which section of the fault is most likely to have an earthquake next proved straight forward for the candidates with most correctly identifying Dixon's Bluff as it had not moved at all over the previous 10 years.

e There was a varied response to this question on how earthquakes occur when stored stress is released with many candidates struggling to produce a coherent explanation. The best answers discussed the build-up of strain energy to the point when the rock fractured, releasing the strain energy as seismic waves/ground movement. Other good answers linked the release of energy to the Elastic Rebound Theory. Another successful strategy involved an explanation backed up by annotated diagrams showing the ductile deformation prior to the brittle failure forming a new unstressed position.

f It was impressive how many candidates could link liquefaction to unconsolidated sands. Marks were lost if the candidate did not link liquefaction to the effect it would have on structures such as sinking or collapse. Many ignored the consolidated sandstone completely and so could not gain the second mark. It is quite common for candidates reading a question where there is a comparison "why is x greater than y" to discuss x but ignore y. It is important that candidates are aware of this and so give equal weight to discussing both x and y, ie unconsolidated and consolidated.

Q3 Candidates showed a sound knowledge of seismic activity at Mid Ocean Ridges, subduction zones and the lack of seismic activity in shield/craton areas. Candidates did struggle to explain why there are shallow focus earthquakes under the Himalayas. The standard of cross sections of the subduction zone beneath Japan was variable with many being poor.

a i Half the candidates recognised that the aseismic area in Canada is a shield or craton. Most could spell it correctly with only a few putting the e before the i in shield.

a ii Candidates knew that the reason for northern Canada being aseismic is because it a great distance from a plate margin or in the middle of a plate. Answers such as "there is no plate movement" is not strictly true as the plate is moving but not interacting at a boundary.

b i Those who gained this mark either linked the shallow earthquakes to moving magma beneath the Mid Ocean Ridge, or indicated that intermediate and deep earthquakes are usually associated with subduction zones which is not happening in Iceland. Many knew that Iceland straddles a Mid Ocean Ridge but did not know what causes the shallow earthquakes; very few linked them to movement along normal or transform faults. If candidates are discussing earthquakes linked to faults it is important that they link it to fault "movement" and not just saying "due to normal faults".

b ii Describing a process that causes shallow earthquakes in the Himalayas proved exceptionally difficult for the candidates. Candidates always have difficulty understanding the processes involved with orogenesis in general. They need to be aware that it is a combination of folding and reverse/thrust faulting. It is <u>movement</u> along these faults that causes shallow focus earthquakes. Magma is not moving at very shallow depths and there is certainly no subduction beneath the Himalayas.

b iii The majority of candidates knew that subduction was occurring beneath Japan and so could linked the earthquakes to the Benioff zone. A significant number had the direction of subduction incorrect which even if they did not know they could have worked out by carefully studying the map. Most could a give at least two correct labels and many gave more. As always the standard of diagrams was very variable. Candidates should be encouraged to take more time and care with the diagrams so that relatively easy marks are not lost. The best answers and diagrams drew the shallow to deep earthquake foci on the diagram within the Benioff zone.

c i Over half the candidates knew the location of the Nazca plate. It is a good idea for the candidates to learn the names and location of the main tectonic plates.

c ii Most candidates could locate and circle an island arc, most commonly the Caribbean and Aleutian arcs. Some candidates drew the circles over too large an area and so circled continental crust and not just the arc. Candidates should be very careful and precise when circling particular features.

c iii The majority of candidates knew that C is on the Eurasian plate.

Q4 Candidates found explaining the formation of joints difficult, especially the unloading joints. They did however know the difference between faults and joints. The location of key features on the fold/fault diagram was generally successful. Candidates are good at describing folds, but find faults more difficult. Candidates are uncertain about the measurements that can be taken from a field sketch except for the throw/displacement.

a i Many candidates had a general idea that faults are fractures that show relative movement and joints are fractures with no movement, but many struggled to put this into words. This led to ambiguous answers that could not be credited. A few illustrated their answers with well-chosen diagrams, which gave them a better chance of gaining the mark.

b i The best answers showed a number of hexagonal columns with arrows radiating inwards to a cooling centre. Candidates can find it difficult to explain the formation of joints in words alone and so the use of diagrams did allow students to gain full marks on a fully labelled diagram. The majority of candidates knew that the rock contracted as it cooled but did not always link this to causing tension and fracturing the rock to produce the joints.

b ii Candidates had more difficulty explaining unloading joints compared to cooling joints. Many gained a mark for discussing the removal of the weight of overlying rock, which allowed the rocks to expand. The second mark was reserved for a detailed diagram, which proved elusive for most candidates, with only a few drawing and labelling the joints parallel to the erosion surface.

c i Many of the candidates successfully located and labelled joints, cleavage and a bedding plane. Candidates located joints and cleavage with more ease whilst the bedding plane caused most difficulty. A fairly common error was to label the fault line as a joint or cleavage or to bracket a whole bed rather than the boundary between two beds. Again some candidates rushed the labels so that the arrows were more than 1 mm away from the intended point.

c ii An impressive number of candidates were able to recognise that shale is incompetent and then provided a good reason based on the diagram, most frequently that they form cleavage or don't have joints.

c iii The majority of candidates successfully drew the axial plane in the correct place. Candidates did need to be careful as the plane was not straight and so needed to adjust the lines, which most were able to do.

c iv This question required detailed descriptions of the fold and fault and so one word descriptions were not sufficient. Many candidates knew that the fold was an asymmetrical, overfold, synform and so gained this mark, however, few could give any extra detail to the fault description other than stating it is a reverse fault. Additional points could involve mentioning that it is a dip slip fault or describing which side is upthrown/downthrown or which side is the hanging or footwall. Only one appropriate measurement was required with the throw of the fault being the most successful. A minority gave the dip of the fault or

the beds of the synform. Very few measured the thickness of any of the beds. Candidates should be familiar with these skills as they are important for the evaluative tasks.

c v In order to gain the mark for this question candidates needed to have both parts of the answer correct. The majority knew that folds are caused by compression and could spell this correctly however only a very small number worked out that the main direction of the force is from North to South. Candidates must be aware that just saying 'North' is too ambiguous as it could mean to or from the north and so this needs to be made explicit.

Q5 There was not too much evidence that candidates had run out of time by the time they reached the extended prose although there may have been a small number affected by this. The distribution of marks gained for this question was equal across the 8 marks, which is unusual. 10% of the candidates gained 0/8 and the same gained full marks. It appears that a recurring misunderstanding has occurred again where candidates write an essay about evidence for continental drift (fossils, rocks, fold mountains, glacial features matching up) but not about sea floor spreading. The answers relating to sea floor spreading are focused on and radiating from the Mid Ocean Ridge. Therefore good candidates would gain zero marks unless they picked up a mark when discussing the magnetisation of rocks linked to polar wandering curves. Equally, some relatively weak candidates gained full marks as they understood the topic well and in detail.

The best answers made good use of fully labelled diagrams, which emphasises the symmetrical/parallel nature of the features described. Detailed explanation of the formation of the normal/reversed magnetic stripes was expected. Many candidates could describe and explain the increase in sediment thickness and age away from the Mid Ocean Ridges. Discussion of earthquakes and faults was not very common, however gravity and heat flow anomalies were discussed often. Diagrams produced easy marks when used; weaker answers had poorly drawn and labelled diagrams or no diagrams at all.

F792 Rocks – Processes and Products

General Comments:

In general this paper was very similar to the standard of last summer's paper with most questions receiving full marks from some candidates. There were a number of very accessible questions using tables and diagrams where candidates often gained high marks. Although this is a long paper few candidates did not attempt all questions and many of the answers for Q7 were lengthy, giving no indication that candidates were not able to complete the paper in the time available.

The quality of candidates diagrams both for igneous textures, sedimentary structures and volcanoes ranged from the very detailed and fully labelled to a few that lacked all labels and were very difficult to identify. The high quality of some labels enabled text marks to be gained on the diagrams.

The specification for this unit contains a large amount of factual material that requires the use of technical terminology. Where candidates have a good grasp of these technical terms that allow them to be used in the correct way, then marks can be gained for the more straightforward descriptive questions. Knowledge of the igneous classification table and the rocks and minerals that make up the igneous rocks are essential. Similarly understanding the environments of formation for the sedimentary rocks and the differences between rocks formed in different environments, such as sandstones which can form in most sedimentary environments, is very important. Areas of confusion arise due to the different systems used to classify each of the different groups of rocks. Grain / crystal size is a particular problem where igneous and metamorphic rocks use fine as < 1 mm, medium of 1 to 5 mm and coarse > 5 mm. In contrast sedimentary rocks use fine < 0.0625 mm, medium of 0.0625 to 2 mm and coarse > 2 mm. Confusion between mineral names and rock names continues to be a real problem.

There are a growing number of candidates who underline the command words on the examination paper to help them focus on giving a relevant answer. This is good practice as many questions ask candidates to both describe and explain or to give both a similarity and a difference and full marks cannot be gained without both parts of the answer. In the longer questions 6 and 7 candidates are given useful additional guidance next to the pencil icon, so that in Q6 they were told to use examples of named rocks in the classification. In Q7 they were told to refer to lava type and pyroclastics and full marks could not be gained without describing both of these volcanic products.

A number of candidates had used the spare pages at the back of the answer booklet to continue answers or to replace crossed out answers. It is very helpful if candidates clearly indicate where to find additional parts of answers.

Comments on Individual Questions:

Question 1

Q1 This question on the rock cycle section of the specification was well answered with candidates showing a good range of knowledge for most part questions. Only burial metamorphism proved to be a problem, with some candidates unclear about where burial metamorphism takes place.

a) **(i)** This was a well answered question with the vast majority of candidates clearly identifying the correct area. The majority of candidates correctly marked the low pressure and low temperature area though sometimes it was difficult to identify exactly where the label was pointing. A small number of candidates placed the sedimentary rocks in the low grade metamorphic area.

(ii) Another excellent answer with good knowledge of the conditions needed for the formation of igneous rocks. A few candidates incorrectly labelled areas of high grade metamorphism.

(iii) Regional metamorphism was generally known although a number of candidates wrote 'contact' illustrating a weak understanding of the types of metamorphism. A small number of candidates chose completely different terms such as diagenesis or recrystallisation.

(iv) There were many textbook definitions given for metamorphic grade while other candidates wrote equally good descriptions that were able to gain the mark. Incorrect responses tended to be vague without using an appropriate term, such as the amount or degree of metamorphism.

(v) The position of hornfels was generally well known with most answers putting the **X** into the area of high temperature and low pressure allowed.

b) **(i)** There were many excellent answers using the exact terminology. Some candidates did not gain credit because they described a range, e.g. low - medium pressure and / or low - high temperature.

(ii) This question proved quite challenging with many answers not making a clear distinction between diagenesis and burial metamorphism. Burial metamorphism requires higher pressures and takes place deeper in the crust than diagenesis. A large number of candidates failed to link depth of burial to increased pressure or to weight of overburden causing increased pressure. Answers that referred to subduction zones needed to include the idea of high pressure, as this type of metamorphism only occurs in the high pressure belt of metamorphism.

c) There were many high-quality answers with good identification of rocks. The question stated in the stem that these were all metamorphic rocks but sedimentary and igneous rocks were seen as answers. There was some confusion between metaquartzite and marble showing a lack of understanding of the main mineral content. The most common incorrect responses were the sedimentary rocks orthoquartzite and limestone instead of metaquartzite and marble. A number of candidates wrote mineral names instead of rocks showing a lack of understanding of the difference between rocks and minerals.

d) Most answers gave foliation, slaty cleavage or porphyroblastic. The formation of slaty cleavage was well known with good descriptions of the alignment of the micas at 90° to the maximum pressure. The origin of the pyrite porphyroblasts was sometimes confused with the formation of phenocrysts as a result of rates of cooling in igneous rocks. Porphyritic texture was the most common incorrect response. Using the scale shows that the grain size is too small for schistosity.

Question 2

Q2 This question on igneous intrusions and textures was the best answered question on the paper with candidates illustrating good knowledge of this topic.

a) **(i)** Most candidates could correctly identify the sill and dyke. However the transgressive sill was less well known and a range of invented terms such as step up sill or progressive sill were used. The concept of concordant and discordant was well understood.

(ii) The graph was very well done and few candidates produced inaccurate plotting. Some candidates did not draw a line at all or a few drew a line of best fit although they were asked to draw a line graph. A few candidates would have benefited by using sharp pencils to ensure accuracy.

(iii) Generally there was a very good understanding of the processes of cooling and crystal size that were taking place, with excellent answers referring to the chilled margin or cooling by the country rock. Some candidates did not refer to precise crystal sizes, just saying smaller or larger instead of fine and medium/coarse. Other candidates provided a description of the crystal sizes without explaining the reasoning, so limiting the marks that could be gained.

b) There was some surprising confusion between these two common igneous rocks. Where candidates knew the igneous classification table, this question was very straightforward and they gained full marks. On a significant number of scripts candidates had used the blank pages at the back of the exam paper to write out igneous classification tables to help themselves. One of the problems for the difference was stating that the crystal size was smaller without clearly stating basalt has fine crystals and dolerite medium crystals. Where crystal sizes in millimetres are used these must correspond to the igneous and not sedimentary classification sizes. Each rock needed to be clearly identified in the answer. Some candidates stated that the rocks were the same colour without giving the colour as dark or black or melanocratic.

c) Some diagrams were very clear with accurate labels linked to good descriptions of the formation of vesicular and amygdaloidal texture. Some diagrams were not labelled at all and others did not make a clear distinction between the two textures. A few candidates incorrectly suggested that the vesicles were infilled by sediment. A number of candidates did not say that the gas is trapped and instead wrote about gas escaping in the formation of vesicular texture. Gas escaping and sediment infilling with the two most common incorrect responses.

Question 3

Q3 Deltas is usually a well-known topic but this question had a different focus by using a modern example which meant that knowledge had to be applied to a new situation. Some candidates were able to use the data given in the question to make good responses while others did not link their answers to the map in the question. As a result answers for part (b) which required general knowledge of deltas was better than part (a) where the knowledge needed to be applied to this specific location shown on the map.

a) **(i)** There were many very good definitions giving sufficient detail to gain full marks. Some candidates used very general statements that a delta formed "at the mouth" which was not enough detail. Most candidates had the link between the reduction in velocity and the deposition of the sediment carried by the river. A few candidates described the path of a meandering river with no reference to a delta.

(ii) Many candidates correctly stated that a distributary is where the river channel becomes blocked and new channels are formed within the delta. Incorrect responses included tributaries, estuary and braided streams.

(iii) Some candidates did not use the information on the map and therefore gave vague answers that did not refer to the coastline moving North or further out into the sea. Marks could be gained for descriptions of prograding or moving or even pushing out into the sea.

(iv) This part question asked for a description of the sediments that were deposited in these two environments. Some answers simply listed sediments with no description others gave a long list of sediments some of which could not form in the environment. There was a specific mistake of stating that coal / peat forms from the remains of animals! Few candidates appreciated that seat earth was fossil soil.

b) **(i)** The parts of a delta were generally well known though a few candidates invented a new terms such as "middlesets" instead of foreset. Some candidates ignored the scale and the detail on the diagram and interpreted it as continental shelf, continental slope and abyssal plain

(ii) There were some excellent fully labelled sections to show cyclothems. A significant minority of candidates put the seat earth on top of the coal, which is clearly impossible as the seat earth contains the roots of the trees which grew to form the coal. The sandstone in the foresets needed to be cross bedded, though this could be shown either by way of the symbol as a label. Some candidates drew a fining up sequence as a graphic log which was not needed but could still gain full marks.

c) The calculation was successfully completed by most candidates.

Question 4

Q4 Sedimentary structures is a well-known topic but this question asked for more than just the identification of the structures and was focused on the use of sedimentary structures. Knowledge of sedimentary structures was good but applying that knowledge to the very specific questions asked was less successful.

a) **(i)** This straight forward question was often well done with all four sedimentary structures correctly used. The most common error was large scale cross bedding where candidates did not consider it could be used as a palaeoenvironment indicator. It is the most common indicator for sand dunes in the desert.

(ii) There were many excellent diagrams of desiccation cracks which clearly labelled the V shape. The question specifically asked for way up and not the environment of formation but a number of candidates focused on their formation rather than their use. 'Way up' answers needed to refer to older rocks in which desiccation cracks formed and the younger sediments which infill's the cracks. Very few candidates stated which of the rocks was younger or older, nor did they explain why the cracks are wider at the 'top' due to greater evaporation at the surface. Some candidates did an excellent sequence of diagrams to show inversion which is very helpful for an answer on way up. Weaker diagrams omitted to label the actual desiccation cracks.

(iii) Many candidates correctly drew a single sedimentary structure across all three limbs of the fold. The easiest structure to draw is undoubtedly graded bedding; all correct sedimentary structures were accepted. A few candidates failed to follow the instructions given and drew three different sedimentary structures one in on each limb rather than the same structure on all limbs. Labelling the top and bottom of the bed was not done by all candidates some of whom appear to have missed this part of the question. Labels do need to be accurate so that it is clear where the label for the top of a bed is pointing.

b) **(i)** Most answers are very general rather than giving a specific area within a fluvial environments such as the point bar. Few candidates stated the difference of scale between the small scale and large scale cross bedding. Many candidates gained a mark for statements of both environments without any detail. Weaker candidates thought that L was the desert and failed to take into account the scale given

(ii) The palaeocurrent direction was well known particularly by the better candidates.

c) Salt pseudomorphs are well understood and there were some high marks for this question. Many candidates did a sequence of three or four diagrams which when clearly labelled were able to gain full marks. It is important that the cubic shape for the halite crystals is clearly shown and then a cubic shape for the sediment infilling. The term dissolved is essential for the removal of the salt crystals and words such as erode are inappropriate. Virtually all candidates were aware that salt pseudomorphs commonly form in playa lakes. Some candidates incorrectly thought that the salt crystals were buried by sediment before being dissolved. Some weaker candidates thought that the pseudomorphs were the original salt crystal.

Question 5

Q5 This question on igneous crystallisation and Bowen's Reaction Series was the most difficult of the short answer questions. Candidates struggled with the concepts of fractional crystallisation and gravity settling, often confusing the different processes. Knowledge of Bowen's Reaction Series is good but applying that knowledge to crystallisation of magma and then to weathering is more complex. Weathering processes were often explained very general way which could not gain full marks.

a) **(i)** Gabbro as the coarse grained mafic rock was known by a minority of candidates. Other common answers given were granite or minerals such as biotite or even sedimentary rocks such as sandstone. Knowledge of the igneous classification table would help candidates.

(ii) Gravity settling is generally very well-known with the idea of dense olivine sinking to form a cumulate layer accurately described. Some candidates failed to link density with sinking and this were unable to gain the mark. A few did not specifically name the process of gravity settling. A few answers referred to filter pressing which is not likely to operate in a small scale intrusion.

(iii) The identification of the area where the original magma would be found as the chilled margin was very good. However few candidates appreciated that cooling occurred before magmatic differentiation could take place. Some candidates simply repeated the question as their answer.

(iv) This is a challenging question about magmatic differentiation. Good answers most often referred to the later magma being depleted in mafic minerals or enriched in silica. Some answers referred to gravity settling and repeated material from the previous question while others referred to filter pressing or magmatic differentiation without any explanation. Very few candidates explained how fractional crystallisation controls mineralogical and chemical variation within a large intrusion. Good answers referred to the later magma being depleted in mafic minerals or enriched in silica. However none gave the additional detail that the magma is depleted in Mg and Fe. There was little or no reference to specific minerals, their composition and relationship to cooling history. A surprising number of candidates wrote entirely about crystal size which is not relevant for an answer about composition. Some answers were very general referring to some minerals forming under certain conditions which suggests that candidates do not understand this difficult part of the specification.

b) **(i)** The minerals that form Bowen's Reaction Series are generally well known, with many high-scoring answers. The most common incorrect responses were the K feldspar where some candidates omitted the K, and the omission of the term plagioclase in the continuous reaction series even though the Ca rich and Na rich was correct.

(ii) The majority of candidates correctly circled the discontinuous reaction series though a few circled virtually all the boxes.

(iii) Candidates tended to give the most expected response which was that olivine forms at high temperature and quartz forms at low temperature. A number missed out on this mark because they made a general statement that the two minerals formed at different temperatures or that one formed at a higher or lower temperature. These comparative terms do not reflect the extreme difference in temperature between these two minerals and could suggest a difference of just a few degrees. Others correctly used the temperatures given on the exam paper to give a clear statement of high and low temperatures. Very few answers used the other marking points to do with the silica undersaturation of olivine compared to quartz which is all silica. Even fewer candidates understood the idea that the olivine would have reacted with excess silica to become augite.

(iv) A challenging question that produced general answers often on cooling rates crystal size or gravity settling which are not relevant. Few candidates made the link between the information on the diagram of Bowen's Reaction Series and the impact this would have on crystallisation within the intrusion itself. Answers had to be linked to the intrusion as asked in the question but very few candidates did this and missed the relatively straightforward mark for the Ca rich plagioclase feldspar forming in the lower part of the intrusion with the Na rich in the upper part of the intrusion.

c) **(i)** Most candidates knew that it is the mineral quartz that is most stable at the surface though a small number stated that olivine was the most stable and in one case quoted diamond. The reason was more of a challenge with many general answers that lacked detail of either the chemical and physical resistance or the temperature of formation linked to conditions at the Earth's surface.

(ii) The term hydrolysis was well known, though spelling was inaccurate in some cases. Some candidates gave an explanation that referred to the production of clay minerals whereas this question asked how the solutes formed. The question stated that it was the feldspar that was broken down but many candidates repeated this information without adding how it had been broken down. The most common misunderstandings were to use the term erode or even evaporates or precipitates instead of the feldspars reacting and the soluble elements being dissolved. It is the individual minerals that react not the whole rock. The important process is a chemical reaction – the feldspar does not just dissolve.

d) Weathering by carbonation is poorly understood. A number of candidates referred to hydrochloric acid instead of carbonic acid. Many answers omitted essential parts of the process; the limestone reacts, with the acid and is dissolved are the three essential parts. The second mark could either be for the production of the carbonic acid or for detail such as the equation. Common errors tended to be in accurate terminology "water reacts with carbon" instead of carbon dioxide or "carbonate from the limestone reacts to form carbonic acid". The term erode or weather was used instead of dissolve.

e) There were many very good answers to this straight forward statement of methods of mechanical weathering. Common incorrect answers were terms such as attrition, abrasion, erosion, hydraulic action or animal burrows. A few candidates gave both frost shattering and freeze thaw as separate answers.

Question 6

Q6 This question was highly structured, giving candidates four clear headings. In addition they were told that they must use examples of named rocks. Where candidates had written their answers using these headings they were less likely to omit sections and more likely to gain high marks. Some candidates thought the question asked for the differences between clastic and non-clastic rocks. Unstructured answers tended to be lists or a series of general statements.

A number of candidates are confused about what are clastic and non-clastic sedimentary rocks. As a result answers were often contradictory referring to shale as non-clastic and an oolitic limestone as clastic.

Where the term classification was not clearly understood candidates wrote about the conditions of formation and the environments in which the rocks formed. Classification needs to be entirely about how sedimentary rocks can be grouped together using specific descriptive terms.

Grain size

Where candidates knew the exact sizes for sedimentary rocks, they often quickly gained three marks. Unfortunately some used different size ranges, for example sand being 1 mm to 2 mm and others used igneous sizes of 1mm to 5 mm. A number of candidates did not use any rock names and therefore could not gain many marks. Grain size is not used to classify non-clastic rocks.

Grain shape

This was often very well-known with breccia being most commonly quoted as an angular rock and conglomerate as a rounded rock. In some answers there was extensive description of the relationship of grain shape to transport which is not relevant to an answer about how the rocks are classified. Grain shape is not used to classify non-clastic rocks.

Mineral composition

The most common correct answer was that limestone is made of calcium carbonate/calcite but there were a lot of answers where the connection needed to be found from different parts of the answer. A few answers gave the mineral composition for a range of rocks, particularly orthoquartzite, arkose, desert sandstone and clay. The correct composition for greywacke in was rarely seen

Fossil content

This was often very well answered with good descriptions of coccoliths in chalk or corals in reef limestone. Many students correctly discussed fossiliferous limestone A number of candidates continue to write about oolitic limestone being made of little animals. Only a very small number of candidates referred to plant fossils in coal. Fossils are very common in the fine-grained clastic rocks such as clays but many candidates stated that clastic rocks do not contain fossils. In general the relationship between fossils and clastic rocks was poorly understood.

Question 7

Q7 Many candidates showed a high level of knowledge of volcanoes and their products. A large number of candidates wrote additional information about the environment of formation at different plate margins for these volcanoes, which unfortunately could not gain any marks for this question which was entirely on volcanic products. A minority of candidates confused the viscosity for the two volcanic types and gave very muddled answers. Wherever possible, if the mistake was consistent, then ECF was used to allow half marks. There were few mentions of the lava types, basalt and andesite, nor of the respective silica percentages.

The question asked for both the distribution and the type of the products so that candidates were expected to give both parts of the answer in order to gain full marks. Descriptive lists of e.g. mafic, low viscosity, lava spreads far, pahoehoe, few pyroclasts showed that candidates understood the material without clearly answering the question or giving an explanation. Some candidates gave a generic answer on volcanoes mentioning neither intermediate nor mafic, so that it was difficult to identify the differences between the two types of volcano.

Mafic volcanoes were regularly described very well but explanations were not always clear. Diagrams needed to show the very low angle sides and broad base with appropriate labels such as vent and crater.

Intermediate volcanoes were confused with silicic but could still gain full marks if they discussed strato/composite volcanoes. Diagrams needed to show alternating layers of lava and ash parallel to the sides of the volcano, as well as the steep sides. Steep in this case is actually an angle of between 37° and 45° and not the angles of 70° plus that were seen. Diagrams without labels do not contribute to an answer.

F793 Practical Skills in Geology

General Comments:

The general standard of work submitted this year was good or better than previously, with some excellent responses seen by moderators. Candidates demonstrated excellent subject knowledge and were able to express themselves clearly and concisely using a sound range of geological terminology. The tasks which had been carried over from last year were largely popular and candidates had clearly been well prepared for the tasks. For some centres issues remain with poor photograph and sketch labelling and measuring. Marking was sometimes on the overgenerous side and had not taken note of relevant additional guidance in the mark schemes.

The Moderating team in general found that in the Centre-based Tasks, CBT1 and 3 were more popular than CBT 2.The Centre Based Tasks remain more popular than the alternative Fieldwork Task, although where centres have used fieldwork for several years this pattern was maintained.

Most centres now provide clear annotation of candidates' work and indication of where marks are being awarded. This enabled the moderator to follow clearly the centre's marking and helped in making an agreement with them. In a small number of cases the ticks and marks did not always seem to match up with the marks being awarded, which caused moderators a few problems.

Administration was completed to a high standard by most centres although clerical errors are becoming more common. This resulted in delays in the moderation of some centres whilst these were sorted out. Please do take care, especially if a candidate's marks have been changed, to check that the right mark is clearly shown and is recognisable on the script, and that the correct total is shown. In a few cases, internal moderation had been carried out and marks had been changed on the script but totals had not been amended.

The additional guidance about what precisely is required in candidate answers is provided to help centres make judgements and award marks correctly. A small number of centres are still not taking note of this, resulting in over marking on some question components. In a few instances, centres still introduce new additional marking points which they have chosen to accept. Centres are reminded that they need to contact OCR if they wish to query any element of the mark scheme and to check Interchange to ensure they are using the most up to date version of the relevant mark scheme.

Fieldwork Tasks caused fewer problems this year. Moderators saw some very good examples of high standard work, with supporting annotation and thorough marking clearly linked to mark schemes. It was good to see centres are now starting to submit photos, sketches and other data with fieldwork in the same way that trial data is provided for centre based tasks. This is a great help in moderating fieldwork.

Centre Based Tasks this year were nearly always accompanied by supporting trial data and comments where problems occurred despite trialling. A small number of centres still give marks for results which clearly conflict with the trial data, but as the student results were consistent with each other's, moderators were able to accept the awarded marks on the basis of teacher's comments. If an obvious point appears to have been missed out from the mark scheme please contactgcesciencetasks@ocr.org.uk.

The Evaluative Tasks were clearly and accurately marked with close adherence to the mark schemes by the vast majority of centres. If an obvious point appears to have been missed out from a mark scheme please contactgcesciencetasks@ocr.org.uk.

Comments on Individual Questions:

CBT1 There were a few problems with consistency of weight and density data, however if results were applied to the average density values of the different layers of the Earth candidates could still earn maximum marks. It is important that when an explanation of variation in possible density values is asked for, candidates offer this rather than simply identify a factor. Where sketches are being asked for, candidates need to provide a full range of labels for the features they include, such as clasts. The final part of the task asked candidates to draw a stratigraphic log from a photograph and provide annotation. This was done well by a lot of the candidates and is clearly a skill which centres are teaching well.

Q1ai No problems; done well

Q1aii It is important that responses refer to the average density values of the different layers of the Earth as reasons, in order to gain marks

Q2 ai/ii No problems; generally done well

Q2b The x had to be in the right position on the diagram as well as the identification, to gain the mark. Some responses were credited with marks with no x

Q2ci Done well.

Q2cii Done well, but clasts also needed labelling for both marks.

Q2d Generally done well but some centres are too generous with marks for labels or measurement.

2e Done well by many, but annotation and description were sometimes marked a little generously.

CBT2 This task was less popular but provided very few problems for candidates. In some instances, centres did not always follow the additional guidance in the mark scheme and sketches were a little over marked.

Q1 ai,ii,iii,b,c,d : Generally done well with few problems.

Q2a, bc : Generally done well with few problems.

Q3 a,b,c : Generally done well with few problems.

Q4 Generally done well, but some centres were too generous with marks for labels or measurement.

CBT 3 There were a few reported issues with the practical task about getting consistent data – teacher comments and data were essential here. Some problems with initial settling were reported and in quite a few instances candidates made inaccurate readings of X and Y in the practical but were still credited with marks. Some centres applied additional issues as credit worthy for problems with accuracy which were not on the mark scheme. These have to be submitted to OCR before this can be accepted. Centres also tended to credit answers on gravity settling and the experiment in a general way without reference to samples A and B.

Q1ai,ii Done well with few problems.

Q1aiii Errors were seen with inaccurate readings of X and Y

Q1b Done well, but see general comments above.
Q1c Generally done well, but a few centres are still crediting general lab safety precautions and not following additional guidance comments in the mark scheme.

Q2ai Generally done well, but some responses were over marked, with no real comparative details and labels.

Q2b/Q3a,b: Done well, with few problems.

ET1 This was a new and a popular task with many centres. Some centres tended to credit responses with maximum marks when explanation was not really evident. The photograph of an airfall pyroclast deposit caused some issues, with a significant number of candidates struggling to correctly identify material, but still being awarded marks. Where description and explanation of a trend on a graph is asked for, it is important that candidates cover all the changes that are evident.

Q1ai Generally done well, but some candidates did not refer to the information provided in the stem of the question

Q1aii Done well, with few problems

Q1b Some responses did not really give clear explanations but were given both marks. Most identified and described the 2 lava types.

Q2ai,ii,iii Generally done well, with few problems.

Q2b This caused a few problems, with correct identification of material.

Q3ai,ii,iii Done well, with few problems.

Q3b There was a tendency for responses to miss the idea of past lahars and valleys as being important in identifying high risk areas.

Q4 a There was a tendency for candidates not to refer to the post eruption decrease in ground level, so the mark could not be awarded.

Q4bi A lot of candidates did not really refer to idea of harmonic tremors linked to vibration of magma.

Q4bii Quite a lot of candidates picked dates when more earthquakes occurred, rather than the initial date.

Q4c No real problems, generally done well.

ET2 The photo of the Permian sandstone sequence was often poorly labelled, however the stratigraphic log was often drawn well – candidates are clearly being well prepared in this skill. Despite the information provided, many responses however failed to explain the significance of the siltstone as a seat earth, or describe fully all the elements of the deltaic sequence. Other parts allowed candidates of all abilities to write good answers, using relevant geological terms, both describing and explaining them.

Q1ai.ii,iii, Q1bi.ii,iii No real problems with these parts.

Q2ai.ii Done well; no problems.

Q3 ai Done well.

Q3aii Many candidates failed to explain the significance of the siltstone.

Q3b Few problems, but many responses did not develop the full delta sequence.

ET3 This task was carried over from last year and popular with a lot of centres. It was done well by most candidates, although some elements on mid-ocean ridges requiring both description and explanation were sometimes over marked. The sketch element was sometimes over marked, though in the majority of cases it was well marked with few problems. Many candidates were able to write good, detailed responses on this task.

Q1ai,ii,iii,iv,bi,bii,c Done well, with few problems.

Q2a Generally done well, with few problems.

Q2b Done well, but Rock 1 could be either C or D.

Q3ai,aii,iii,b were done well, with few problems.

Q3c Many candidates got the current direction the wrong way round in ci.

Q3ciii Done well, but a few responses were credited with full marks which did not explain both the rock and the sedimentary structures.

Fieldwork Tasks.

There was some very good fieldwork in evidence here, including logs and sketches.

As in previous years, the fieldwork tasks caused the moderators the biggest problems. There remain some inconsistencies in application of marking, mark schemes, quality of work and guidance to students between centres, but this is improving as standardised approaches to rock description and log marking spreads. However, moderators are still seeing instances where some weak candidates were getting 6-8 marks for an evaluative task and 18-19 for their fieldwork.

F794 Environmental Geology

General Comments:

Most candidates were able to demonstrate sound knowledge and understanding of the key ideas and concepts of the Environmental Geology unit. Candidates with good synoptic knowledge and those who were able to apply their understanding of the unit content to unfamiliar situations scored highly, as did those that carefully analysed the questions, taking due note of command words such as describe and explain. There was evidence that some candidates were limiting their responses to some questions because they made incorrect assumptions about how the marks would be awarded. For example, in some questions asking for both description and explanation, each marking point required a description linked to an explanation.

A small number of scripts were difficult to read due to poor handwriting and in some cases, in the questions that tested the quality of written communication, it was impossible to decipher whether the spelling of subsidence and magnetometer were correct. In these cases benefit of the doubt was not given. Virtually all candidates attempted the final extended question on placer deposits but a small number of candidates made 'no response' to some questions on the paper. Question 4d on residual deposits had the highest omission rate on the paper.

Comments on Individual Questions:

Q1 Groundwater supply proved to be a well-known area of the specification but some candidates struggled to give good answers to the parts of the question that required explanations rather than descriptions.

(a) (i) Most candidates were able to correctly label the extent of the recharge zone on the cross-section diagram. However there were a small number of 'no responses' and a few candidates lost the mark through careless drawing of the line showing the extent.

(ii) This question requiring candidates to match the features in the table to their correct position on the cross-section diagram was done very well, with only a very small minority making mistakes. The most common incorrect answers confused the confined and unconfined parts of the aquifer.

(iii) There were some excellent explanations as to why the spring may produce water that is suitable for drinking, with the vast majority of candidates correctly describing the natural filtering effect of water percolating through the pore space of rocks. However, a number of candidates lost the mark because they did not go on to explain that this process removes impurities / contaminants from the water, thus making it suitable for drinking.

(iv) Some candidates found this stretch and challenge question demanding. Although many candidates realised that both wells **F1** and **F2** tap a confined aquifer and are artesian, not all managed to give a correct description linked to an explanation from any 2 of the 3 marking points available. There was some confusion between confined and unconfined aquifers. The explanation of the difference between the two wells was done less well. There were vague references to well **F2** being further down the hill than **F1,** but many failed to give good geological explanations using knowledge of hydrostatic pressure and hydrostatic head.

(b) (i) The majority of candidates were able to define the term *water table* correctly. The best answers considered the situation both above (unsaturated rock) and below (saturated rock) the water table. Some candidates lost the mark because they referred to the water table as a point rather than a level, surface or

boundary, while others referred vaguely to water in the ground rather than water in rocks.

(ii) There were some excellent responses to this question asking for a labelled diagram to show the effect pumping water from a well has on the water table, but a number of candidates would be well advised to draw and label their diagrams more accurately. The description of a cone of depression was well-known and correct answers were awarded credit irrespective of whether the situation was shown in a confined or an unconfined aquifer. A few ascribed the drop in the water table to the (over)pumping of water from the well, but ignored the command to use ideas about hydrostatic pressure so lost the explanation mark.

Q2 The quality of responses to this question on coal mining was variable, with some candidates showing detailed knowledge of opencast and underground coal mining methods, while others struggled to use appropriate technical terminology in their answers.

(a) (i) The term *reserves* was well understood with most candidates attaining the mark for a correct definition. A minority failed to give their definition in terms of the amount of the resource that can be extracted at a profit and mistakenly defined reserves as all of the resource left in the crust.

(ii) A significant number of candidates failed to correctly calculate the percentage of coal produced from open cast mines in 2010. Of those that did get the correct answer of 58.4%, some did not appear to know the meaning of 'one decimal place' and gave their answer to the nearest whole number thus losing the mark.

(iii) More candidates were able to correctly calculate that the reserves would last 22.5 years at the 2010 rate of production. Again there seemed be to misunderstanding as to the meaning of 'one decimal place' and a number of candidates rounded their answer of 22.47 down to 22.4 instead of up to 22.5. No candidates calculated how long the reserves would last from the present year (2014) but, if correct, this answer would have been accepted.

(b) There were many excellent answers to this question about how coal is mined by opencast methods which included good use of technical terms such as overburden and dragline excavator. A few candidates limited their marks by writing very simplistic descriptions of digging a hole and extracting the coal by using explosives to blow it up. As the question asked for the mining method, backfilling the open cut with overburden as mining continues gained credit, but descriptions of how the open pit is restored after mining is complete did not.

(c) This question asking why more coal is produced from opencast mines than from underground mines proved to be a good discriminator. Many candidates made statements such as it is easier, cheaper or safer but without any explanation as to why. Only the strongest candidates gave two well-considered explanations based on specific geological, safety or production problems that make it more difficult to carry out underground coal mining.

(d) (i) The vast majority of candidates knew the cross-section diagram showed longwall mining and many gave concise, but detailed, descriptions of this mining method that easily scored maximum marks, even though two correct statements were required for each mark. However, a minority of candidates merely described what they could see on the diagram using no technical terminology whatsoever.

(ii) The geological problems of seam splitting and faulting were well-known but many candidates failed to describe and explain how these problems might make it uneconomic to mine the coal further to the east. In particular, a number of candidates just repeated the wording in the question saying these problems would make it uneconomic.

(iii) The technical term *subsidence* was well-known but not all could spell it

correctly. 'Subsidance' was the most common incorrect spelling and candidates who did not write a legible answer were not awarded the benefit of the doubt.

Q3 Most candidates were well-versed in their knowledge of engineering geology and all attained some credit for their answers about the Vaiont dam disaster, concrete manufacture, and landfill waste disposal. However, not all correctly applied their knowledge to the specific situations given in the question.

(a) (i) The geological factors affecting landslides were well-known, but few candidates attained all three of the available marks. Not all candidates addressed the specific geological situation of the Vaiont dam and reservoir presented to them in the question, while others did not confine themselves to geological factors. Some failed to use the technical term dip when referring to the attitude of the strata and there was confusion with the angle of slope. Others struggled to give a clear description of the direction of dip towards the reservoir and failed to go on to explain how this situation would increase the likelihood of landslides. The geological factors of rock permeability and the presence of weak and incompetent clay beds were not referred to by all candidates, while others gave explanations about water in rocks best reserved for part (ii).

(ii) Most candidates gained some credit for their explanations as to how the prolonged and heavy rainfall contributed to the landslide. The most common correct answers referred to the effect of water adding weight to rocks or acting as a lubricant along bedding planes.

(b) Many candidates were able to correctly list at least three geological materials used in the manufacture of concrete. However, descriptions of the materials were weak, so few gained the second mark.

(c) (i) Most candidates were able gain some credit for describing and explaining an advantage and a disadvantage of using site **G** for landfill water disposal. However, to gain full credit for their answers, candidates needed to give descriptions linked to explanations. Some candidates failed to appreciate that the over-riding advantage is the impermeable nature of the clay and siltstone which prevents the escape of leachate. The presence of horizontal beds would be irrelevant if the beds are permeable and many confused the rock symbol for clay and siltstone with bedding. There was confusion between the terms leaching (where elements dissolved from rocks are carried downwards in solution) and leachate (a fluid generated by water dissolving soluble chemicals from landfill waste). Likewise, although many stated the fault would allow the leachate to escape, few explained this in terms of the fault being a zone of permeability. There was confusion between the fault being a zone of permeability thus allowing leakage of leachate versus the fault being a zone of weakness thus allow subsidence / settlement cracks to open up – permeability and weakness were being used as interchangeable when in reality they have very different meanings.

(ii) Most candidates were able to provide good assessments as to why site **H** would be a poor choice for landfill waste disposal, but not all candidates included suitable explanations in their answer.

(iii) Ground improvement strategies to improve site **H** for waste disposal were well-known with the laying of an impermeable liner made of clay or plastic or geomembrane being the most common correct answer given. Those that merely wrote a named lining would be impermeable only gained one mark as they did not correctly describe the process of laying the material prior to the landfill operation commencing. Grouting was not described very well with few candidates giving good descriptions of pumping liquid cement into the underlying rocks to make them impermeable. A significant minority erroneously referred to the use of sprayed shotcrete or concrete.

Q4 This question on geophysical exploration techniques proved to be a good discriminator. Although virtually all candidates were able to show some relevant knowledge, only the strongest candidates were able to apply their knowledge to correctly interpret the results of the gravity and magnetic surveys. The last part of the question asking for a description and explanation of the formation of residual deposits was not answered very well.

(a) (i) The majority of candidates were able to attain some credit for a description of how a seismic reflection survey is carried out, but there appeared to be some confusion with echo sounding as not all correctly described seismic waves travelling into the rock below the seabed. Some failed to include technical terms in their description. For example, some did not specify the source of the seismic waves, while others did not name the detectors as geophones or hydrophones. Some candidates spent far too long drawing very complex diagrams that added nothing to their answers and those that used a ruler to draw the seismic waves reflecting off layer boundaries or added an arrow to show the direction of travel of the waves were in the minority.

(ii) This stretch and challenge question on how data from a seismic reflection survey can be interpreted to identify potential oil and gas traps had one of the lowest facilities on the paper. The most common correct answers referred to the use of the data to identify suitable trap structures such as anticlines. Although there were a few excellent answers that discussed the use of two way travel times to calculate depth or seismic velocities to provide information about rock composition, these were in the minority. There was some confusion with gravity surveys, with some candidates referring erroneously to negative and positive anomalies or an excess and deficit of mass.

(b) (i) More than half of the candidates correctly identified that the map potentially showed a salt dome trap and the next most common answer, anticline trap, could gain up to a maximum of 2 marks. Not all candidates used correct terminology to describe the negative gravity anomaly or deficit of mass to gain the second mark and, although many appreciated evaporites have a low density, not all compared this to the surrounding rocks to gain the third mark. A significant minority were clearly confused with metals' exploration and referred incorrectly to the presence of silicic intrusions.

(ii) About half the candidates that identified the hydrocarbon trap as a salt dome in part (i) correctly labelled a site for exploration drilling around the outside of the negative anomaly (i.e. around the flanks of the salt dome). Those that misidentified the trap as an anticline or those that referred to the possibility of an anticline trap above the salt dome were awarded error carried forward if they labelled in the centre of the negative anomaly (i.e. within the -30 milligal line).

(c) (i) The number of candidates who correctly knew the instrument used to carry out a magnetic survey is called a *magnetometer* were in the minority and even fewer were able to spell it correctly. ‘Magnometer’ was the most common incorrect spelling.

(ii) Most candidates were able to plot the magnetic data correctly but not all joined the points to complete a line graph. A large number lost the second mark because they did not plot and follow the instruction to <u>label</u> a horizontal line to show the background reading of 4510 nanoTeslas.

(iii) Many candidates scored the mark for correctly competing the sketch cross-section to show the probable location of an igneous intrusion. Just drawing an unlabelled line was insufficient to gain the mark as it was not clear as to whether the candidate thought the intrusion was inside or outside the line.

(iv) Only the strongest candidates, with good synoptic knowledge of igneous classification, attained the mark for correctly suggesting the likely rock type as being a mafic or ultramafic intrusive rock such as dolerite, gabbro or peridotite. Virtually all of those who did give a suitable rock name were then able to give a

correct accompanying explanation. Granite was the most common wrong answer, with many candidates suggesting incorrect explanations for granite to fit the data.

(d) There were some excellent responses to this question asking for a description and explanation of the formation of residual deposits. However, there were also a significant number of 'no responses' and some candidates' answers erroneously referred to the formation of hydrothermal, gravity settling, secondary enrichment or placer deposits. Those that referred specifically to the formation of aluminium deposits of bauxite were in the minority. Very few candidates correctly described that the residue is left at or close to the surface and even fewer correctly described the requirement of aluminium-rich rocks such as granite, impure limestone or volcanic ash / tuff. In addition, although some answers referred to jointing in rocks, only a handful went on to explain that joints allow water in for hydrolysis reactions or increase the surface area available for chemical weathering.

Q5 This extended question on the formation of placer deposits of cassiterite, gold and diamonds produced the full range of responses from 0 to maximum marks. It should be noted that diagrams were an essential component of the required answer, so answers without diagrams were limited to a maximum of 6 marks. Equally well, it was essential that answers contained some continuous prose to satisfy the 'describe and explain' parts of the question.

Some candidates concentrated solely on describing and drawing diagrams showing the sites of deposition of placer minerals and thus lost all the marks available for describing and explaining the source of the placer minerals, the processes of weathering, erosion and transport that separate the minerals, and the properties of the minerals that allow them to survive and be concentrated in placer deposits. Rather than writing specific statements about the individual properties of cassiterite, gold and diamonds, a number of candidates lost marks because they wrote generalised statements about placer minerals, e.g. they are all hard.

While there were some excellent, accurate, fully labelled diagrams that easily attained maximum marks for the sites of deposition of placer minerals, other diagrams were very untidy and inaccurate, with poor or no labels. A common error was not labelling the direction of river flow. This was a particular problem for diagrams showing placer deposition upstream of projections as it was not possible to tell which side of the projection was the upstream side. As the question asked about the formation of placer deposits in rivers, diagrams showing the formation of placer deposits on beaches were not awarded any credit.

F795 Evolution of Life, Earth and Climate

General Comments:

Most candidates were able to demonstrate sound knowledge and understanding of the key ideas and concepts of this module. Marks ranged from 2 to 92 out of 100. The overall total mark distribution was skewed to the right, but the mean mark was slightly lower than the last examination session.

It was disappointing that some candidates were not able to demonstrate a good synoptic knowledge for the questions linked to F792, in some cases unable to give the name of a carbonate sedimentary rock.

A few gave excellent answers in unfamiliar situations and scored highly, in particular in those questions designed to stretch the most able. There were some questions with the emphasis on "describe" and "explain"; on the whole these were answered well, with careful linking of each point to an explanation.

There was some evidence that the ability to draw and identify the morphological parts of particular fossils had improved. There were many excellent responses for 3b (iii), the crinoid question. However, the diagrams for included fragments, cross cutting relationships and mould formation were particularly poor on the whole.

The tally charts were usually completed correctly, but the ability to plot a rose diagram eluded many. This skill should be taught in centres to apply to both F792 and F795, and such a method of display should not have come as a surprise to candidates.

Virtually all candidates attempted the extended questions and there was no evidence that candidates had ran out of time. In some instances extension pages were used in the booklet to continue answers and draw diagrams. It should be noted that unlabelled diagrams do not gain any marks.

Comments on Individual Questions:

Question No. 1

This question generated a good spread of marks, with the majority of candidates scoring between 11 and 15 marks in total. The minimum mark for this question was 4 and less than 2% gained the full 17 marks.

1a (i) This part question was generally well answered by most candidates. There was excellent recognition of the fossil groups. Some candidates could not classify the phyla of each fossil. Some failed to recognise both A and C as molluscs. Fossil D was commonly identified as a microfossil, gaining no credit.

1a (ii) This part question was generally well answered by most candidates. Some candidates opted for 'whorl' on the gastropod, despite the bracket over at least four of them. The commonest errors were labelling the "ambulacra" as "interambulacra" and the "phragmocone" as the "pro-ostracum".

1a (iii) Almost all candidates could state modes of life for both fossils. Those unsure of the mode of life stated a list which encompassed many modes of life, gaining no credit. Some gave contradictory answers, for example, naming benthonic as a mode of life and then discussed swimming. Over 55% of candidates gained 2 marks for this part question.

1a (iv) Smaller or abundant were sometimes stated as answers for this part with no reason as to why this meant that they were found in more rock types. There were some excellent answers linking the silica skeleton of the radiolarian to preservation below the carbon compensation depth (CCD).

1b (i) This question required the candidate to use shading, or brackets to indicate the extent of the morphological features. A number of candidates used arrows, which ended in a point, gaining no marks. A few candidates transposed the structures or correctly labelled the structure on one fossil and incorrectly on the other. The morphology of trilobites is generally well liked, as over 70% of the candidates gained full marks.

1b (ii) The identification of a thoracic segment was often only indicated by an arrow to a single point within the specified area. Better candidates shaded and then labelled a thoracic segment. Both approaches were credited as correct.

1b (iii) Most candidates correctly counted 11 thoracic segments and were able to link this to the numbers of pairs of legs. Incorrect answers appeared as random guesses.

1c (i) Most candidates understood the defence mechanisms to protect a trilobite in life. This part question did not discriminate very well as over 85% of candidates gained the mark.

1c (ii) The candidate had to recognise that the eyes on fossil F were crescentic and link this to an increased field of vision. Some incorrectly described the eyes as “bigger” or “rounded” gaining no credit. The eyes were in fact the same size, but the shape differed. Some incorrectly described the eyes as stalked. Around half of the candidates gained this mark.

1c (iii) There were some poor answers for this part question as some candidates did not answer the question, which was about the spines. A few misinterpreted the morphological features and described one trilobite as a nektonic form, perhaps looking for greater difference in the modes of life.

Question No. 2

This question generated a good spread of marks. Most candidates gained between 6 and 10 marks overall.

2a (i) Most candidates managed to classify the data and then tally it correctly. It was clear that some candidates had not encountered such a task and had no idea how to complete the tally chart. This part question generated a good spread of marks.

2a (ii) Some candidates had never plotted a rose diagram, many found difficulty in plotting their data and around 20% of candidates gained no marks for this part question. Very few knew to use a scale and to ensure that the segments were as accurately plotted as possible (to within one mm). Many who used a reflected diagram failed to make it a mirror image. Some used different scales on each rose diagram, making part (iii) more difficult to interpret. Error carried forward was allowed for this part question, meaning that incorrect answers from part (i) were not penalised in part (ii).

2a (iii) The instructions to describe and explain were neglected in many answers. There was sufficient description but often little explanation of the different current strengths that had aligned the bones. This was designed to challenge the candidates understanding of the information presented and generated a good spread of marks overall.

2b (i) Candidates confidently described the features of the dinosaur as an herbivore. Peg-like teeth were often described as “leaf shaped”. The most common mistake was to describe the jaws moving side to side to grind the vegetation which was not a feature of this dinosaur.

2b (ii) Many chose to describe the shape of the teeth and their function in a carnivore. Some discussed strong legs without qualifying the bipedalism of the dinosaur.

Question No. 3

The spread of marks generated for this part question made it a good discriminator, with the majority of candidates gaining between 9 and 13 marks overall. Around 1% gained full marks.

3a (i) Most candidates successfully identified 3 or 4 of the structures. Occasionally they labelled all structures on both diagrams, sometimes correctly and other times producing a contradiction with their answers. Accuracy should be stressed when teaching candidates labelling techniques.

3a (ii) Most candidates answered this part question correctly. Incorrect answers included rugose and scleractinian, along with Cnidaria. Some went back to the diagram in part (i) and labelled the corals here, which should be discouraged.

3a (iii) Candidates were able to state that the function of the septa was for support, but some failed to say state what the septa supported. At this level the answer needed to name a morphological part that required support in the coral. Almost 60% of candidates were unable to meet this requirement.

3a (iv) Many candidates failed to read the question with care and answered a question on the conditions for modern coral growth. Some missed the idea of symbiosis altogether, and gave general answers discussing how a colony of corals would grow. Some implied that the coral lived alongside the algae, sometimes incorrectly describing zooplankton or dinoflagellates. A lot of candidates lost marks by omitting any science in their answers, unwilling to commit to the actual processes involved in the symbiosis, and giving answers only in general terms.

3b (i) It seemed surprising that many candidates were unable to answer the synoptic question on carbonate rocks, from F792. Mistakes such as interpreting all circular objects as ooliths could have been avoided if the scales had been considered or that the question on identifying corals had been adequately read. Many knew that the fragments were crinoid ossicles yet failed to name the limestone accurately. Unusual answers included chalk or even granite. This part question did not perform as well as expected and the importance of synoptic content needs to be stressed when teaching fossils.

3b (ii) This was generally answered correctly. Some gave lists of possibilities including graptolites, trilobites and even Archaeopteryx, introducing a contradiction into the answer and failing to gain the mark.

3b (iii) Pleasingly, crinoids were very well drawn and labelled by candidates. This was reflected by over 80% gaining full marks for this part question.

3b (iv) The majority of candidates identified the correct position on the cross-sectional diagram and there were good links made between the coral growth and the conditions for preservation. The commonest incorrect answer was placing the fragments within the lagoon. A minority hedged their bets and labelled the junction between two environments.

3b (v) There were some excellent descriptions, with a good level of detail, of the environmental conditions required for coral growth. A few listed general ideas, such as “tropical conditions” without any clarification, and did not gain the marks.

Question No. 4

This question generated a significant spread of marks, most candidates gained between 8 and 13 marks overall.

4a Most candidates correctly identified four or five terms indicating an improvement in the teaching of teaching of technical language in centres.

4b (i) Most candidates were able to describe the law of included fragments, though fewer were able to draw the diagram in a clear and coherent way. A large number did not label the fragments as older, and the identification of ages on diagrams was very poor overall.

4b (ii) This part question was answered better than part (i). Diagrams were clearer and more labelling was evident. Overcomplicated diagrams with several cross cutting events built in error, as some were correct and others incorrect.

4c There were many contrasting, open but correct ideas for this part answer. All correct ideas were accommodated within the mark scheme.

4d (i) This was generally well answered with most candidates effectively describing carbonisation and silicification. Some answers not worthy of credit were descriptions which were very general and lacked a mechanism for preservation.

4d (ii) This question was, in general, poorly answered. Commonly there was no attempt at relating to the chemistry of the process. Candidates should realise that, at this level, merely saying that ‘pyritisation involves replacement by pyrite’ is unlikely to attract marks. Bisulphates were commonly used for bisulphides; despite the fact that “sulphate” contains oxygen and the environment in question was anoxic. Other incorrect answers were centred on the conditions for exceptional preservation. This was an excellent discriminator as less than 30% gained full marks.

4d (iii) There were some very poor diagrams drawn by candidates, lacking labels and not addressing the question, which only focussed on mould formation. Many launched into descriptions of moulds and casts, not realising the distinct differences in the terminology. Some good diagrams did not have the internal and external moulds labelled and gained no marks.

Question No. 5

This question gained a good normal distribution of marks with the majority gaining between 4 and 8 marks.

5a (i) Almost all candidates could identify the extinction event. Incorrect guesses bracketed parts of the column together or incorrectly labelled “highs” on the graph.

5a (ii) This question was designed to stretch the most able candidates. Many were able to describe the difference between the graphs, but fewer could elicit an explanation. Few understood that ^{12}C was taken up preferentially by plants. Some related the ^{13}C to the formation of the brachiopod shells, as a supply of carbon. There was confusion about $^{12}C/^{13}C$, using these terms interchangeably and incorrectly. A minority described $^{16}O/^{18}O$ instead of carbon. There were a few that tried to link these charts to the well understood

K/T boundary, missing the marks all together. This question performed the way it was intended, with only the top 7% gaining full marks.

5b (i) and (ii) The candidates commonly confused parts (i) and (ii), reversing perfect answers for isostasy and eustasy. There were some very good descriptions of isostatic rebound and the effects on the UK.

5c This question was designed to stretch the most able candidates and as such was generally poorly answered. Most gained the general mark for shelf dwellers being affected most. Fewer answered the question completely as they omitted giving specific examples of organisms. Weak answers centred around corals and conditions for coral growth, adding in details about coral bleaching. A significant number of candidates identified terrestrial organisms as being less affected by sea level change. Very few candidates gained full marks for this part question.

Question No. 6

This question generated a distribution that is skewed to the right, and the scores were generally high overall.

6a (i) A significant number of candidates were not able to score well on r this basic question on the geological column.

6a (ii) There were some excellent definitions of a system as the rocks laid down during a particular period, but these did not general expand on the basis of dividing up geological time. The idea of using fossils and looking for mass extinctions was also well described by the candidates.

6a (iii) There were surprisingly few correct answers to this section given the basic nature of the calculation. Very few were sure how many decimal places to give or how to reliably round up. Sadly there were a large proportion of candidates who gave the answer based on years per mm.

6b Candidates seemed to think Kelvin assumed the Earth cooled at a constant rate, despite the emphasis on a cooling curve in the specification. Heating by radioactivity (in the core) was the most common explanation.

Question No. 7

On the whole this extended question was answered well by candidates and generated a normal distribution of marks.

The best answers were those that directly compared morphological parts or functions in the same or adjacent sentence. For example… brachiopods have …. whereas bivalves have…… This approach should be encouraged in centres.

As expected, some wasted time discussing similarities, despite the question asking for differences.

A noticeable number of candidates incorrectly identified the siphon in bivalves as a siphuncle and also the bivalve foot was called a ‘tube foot’.

There were some poor descriptions of symmetry where the candidates tried to explain what a median line was, with limited success. Very few candidates identified the brachidium at all.

It was surprising that some candidates believe that the dentition is part of a feeding mechanism. Several stated that bivalves were predators.

Question No. 8

This question was less well answered than the question 7 and generated a distribution of marks that were skewed to the left. Most candidates gained between 2 and 6 marks.

There seemed to be an expectation that microfossils were supposed to be poor zone fossils, as candidates usually knew graptolites were good zone fossils. There were many general comments about slow evolution of microfossils, which is not true. Further confusion surrounded the fact that some microfossils are extant; candidates assumed that this means they can't be good zone fossils.

Many candidates lost marks by omitting the word 'small' for microfossils and 'planktonic' for both graptolites and microfossils. The fact that graptolites were found in different rocks was often stated, the explanation as to why, was often omitted.

Some candidates talked in some detail about the evolution of graptolites, wasting time with detailed diagrams that would only be worthy of one marking point. Similarly, the details included about particular fossil groups were interesting, but did not address the question. Robustness of pollen and spores and the use of them and other microfossils as palaeoenvironment / palaeolatitude indicators is not on mark scheme as the question was about zone fossils and not about interpreting environments.

F796 Practical Skills in Geology 2

General Comments:

For this fifth year of submission year there were many very good tasks submitted and a large percentage of candidates demonstrated excellent subject knowledge. Many were able to express themselves clearly and concisely using a sound range of geological terminology. There was no evidence of candidates struggling to complete the centre based and evaluative tasks within the suggested time of an hour. Most candidates were submitting tasks, which had been offered in previous years; very few attempted the new tasks.

As in previous years, many centres submitted their marks via interchange often well before the deadline and as a result had very prompt replies requesting their sample of work. In many cases once requested centres dispatched the samples extremely quickly which was appreciated by the moderators. Where centres are unable to submit their marks via interchange it is important to send the moderator a copy of the MS1 form as well as the top copy to OCR, so the sample can then be selected. The selection process of the sample is now a computerised process and not selected by the moderator; this year slightly more candidates than in previous years were sampled.

The Excel spread sheet downloadable from interchange is very helpful to input all of the marks achieved by each candidate. The form should automatically calculate the totals using the best marks, however there was a notable increase in clerical errors, some of which could be traced back to addition errors with this form. Centres are therefore advised to check this form upon completion for any mathematical errors. Only a few centres are completing a single task for all candidates, most centres gave candidates two or even three opportunities at Centre Based, Fieldwork and Evaluative Tasks.

Administration this year was a significant problem for the moderating team. The vast majority of the issues were clerical errors. A large numbers of errors arose due to the addition errors from the papers and then wrong marks being put onto cover sheets and from there the MS1 or equivalent. In a large number of cases marks on the papers or fieldwork were added up wrongly; it was noted that this often occurred where section were being subtotalled. Actual marks and sub-totalled marks were present on the same page; both would then be counted in the final addition giving a wrong total. To aid addition, marks should only be placed in the right hand margin next to the bracket showing the marks available. Avoid sub totals and this way the only marks on the paper are for credit in the questions.

Another cause of errors occurred when candidate’s marks had been changed due to internal moderation. It is important to check that the right mark is clearly shown and is recognisable on the script and that the correct total is given. It should be checked that this mark agrees with the mark given on the cover sheet, if one is used, as well as on the MS1. In a few cases internal moderation had been carried out, marks had been changed on the script but totals had not been amended. Ideally all of the paperwork should be carefully checked for accuracy before submission.

A few centres did not carry out internal moderation and errors of accuracy were encountered here. Internal moderation is vital and centres sign the authentication sheet to state that this has indeed been carried out.

The internally assessed work cover sheet is not compulsory but can be very useful for summarising the candidate’s performance and showing which tasks are being submitted. This can be downloaded from interchange. Some centres submitted work where marks were not visible and moderators had to actually add up the marks themselves. A small number of centres

failed to secure any of their candidates' work and a mass of loose sheets of paper arrived. Centres should ensure that all of the work for each candidate is securely packaged; many are still putting a lot of loose un-named sheets into the post.

Centres still need to include a Centre Authentication form. Several moderators had to contact their centres and request the sending of this document. This can delay the moderation of the centre involved. Likewise the teacher trial data must be sent.

In general marking was of a good standard but where marks were on the generous side it was usually a result of issues over the interpretation of the mark schemes. Most centres are applying the mark schemes accurately. Most have read the additional guidance about specific requirements for marks to be given and use this to help with the marking. However a small but significant number are ignoring this column and are not applying the mark scheme. For example in some questions 3 labels may be required, so if only 2 labels are added then marks cannot be awarded. A small but significant number of centres were giving credit to answers, which were not on the mark scheme, and in some cases points, which were definitely incorrect, had been credited. This is not acceptable, as other centres will not be crediting their candidates who have made the same comment. If a centre feels strongly about a correct answer having been left off the mark scheme they should contact gcesciencetasks@ocr.org.uk. The issue can then be taken up and a response back to the teacher usually be received in a matter of days. Several mark schemes over the year have had slight amendments made as a result. All centres should make sure that they sign up for interchange updates. It should be noted that if a mark scheme has some acceptable points and then "AND" is written it means the candidates MUST have points from before and after the "and". This was an issue this year in one of the tasks.

It is important for centres to be using the most up to date mark schemes and papers. Whilst many centres will check on interchange for tasks, it is advisable to only print off papers, instructions and mark schemes as close to the completion of the task as possible. In this way if there have been any additions to the mark schemes centres will be aware of them.

Centres should have received notification earlier in the year that the tolerance for moderation had changed for this unit. Tolerance applied for the 40 marks awarded allow for a smaller difference to be acceptable between the centre and moderator. As a result some centres, which recently have not had mark adjustments, may this year find that they have.

Comments on the Centre Based Tasks:

Centre Based tasks must always be accompanied by the trial results obtained by the teacher in their trial run of the practical. These should reflect the likely range of results which should be expected. In experiments where the samples are destroyed, the data should show similar starting amounts so that the rates/trends of break up can be compared. This helps with applying the tolerances quoted within the mark schemes. If a tolerance is stated it must be applied. Most centres did correctly mark this section; however a small number allowed answers clearly well out of the stated tolerances and this can result in mark changes. If a tolerance of +/- 10% is stated any values beyond this tolerance should not be credited. When an experiment is carried out temperature may have an impact; it is worth the teacher carrying out their trial in the same room/similar conditions in which their candidates carry out the task

Comments on individual tasks:

CB1; This was a new task this year and as a result it was the least popular of the tasks. However it did appear to hold up well when comparing the marks awarded. The experiment was more chemically based than ones used before and it appeared to generate some good results. On the whole candidates did not appear to have any problems with the practical and the precipitates formed were usually showing the expected colours. A few centres did mark the first column a bit harshly if candidates had not mentioned the colour at the interface. However the instructions had asked for the interface colour and as such the mark could have been awarded.

Question1bii) did require some reference to both of the metal elements within the mineral to get the mark.

Most of the answers to this first section showed a sound understanding of metal deposits and this continued with question 2.

The photograph question raised the usual issues about the mark scheme, where centres credited things that were not on the mark scheme or gave marks for insufficient features. It should be noted that marks will be adjusted if this very clear guidance is ignored as the majority of centres are sticking to these requirements.

CB2; This was more popular this year. However the practical did still appear to present problems when it came to answering question 1b). For this question many candidates tended to just describe and not give a reason. When this occurred the mark scheme clearly showed that no mark should be awarded as a description and a reason were required.

Question 1c) still had many centres crediting answers not on the mark scheme; clothing is not relevant for this particular experiment.

Issues arose mostly with question In part ai) the features had to be bracketed as the skill was to identify the extent of the features.

In aiii) the mark scheme clearly stated there was little variation in trilobite size. The majority of centres sampled were crediting quite the opposite. It was not a growth assemblage and there was no sign on ecdysis. This was a clear centre linked issue; the majority of centres 75% or more of the candidates were getting this question wrong.

CB3; Water was the most popular task which is usual, as this was the third year it had been available. Most candidates produced good results within tolerance of the teacher data. Again a small number of centres credited answers which were way out of tolerance. In cases such as these it might be better if the teacher did their trial under different conditions; it is important to carry out the trial in similar conditions/rooms to those which the candidates will use. This allows a greater range of results to be obtained which can make it easier to see which results do fall within tolerance.

Some good answers to the map work and photograph questions were seen. Labelling and annotation of measurements is sometimes excellent but can also be a bit hit and miss. Also that fault alone is not enough, as the mark scheme refers to normal fault, this was a common problem last year and it was unfortunate that this issue continued.

The final question was better than last year; a lot of candidates having no problems. However a few candidates failed to fully explain how the hardness is worked out. It was not enough just to state a hardness value; an explanation to show how the value could be ascertained was also needed. It was worrying that a very small number of centres were marking candidates correct who stated that a nail would scratch quartz.

Field work Tasks

Very few centres submitted fieldwork this year, which was a shame; many had commented this was because many of the tasks had been removed from interchange so they choose to do centre based tasks instead.

There was a lot of good fieldwork in evidence here. Many fieldwork tasks have now been revised in order to pull them more into line with the marking of features such as Graphic logs, which can be encountered in centre based, and evaluative tasks. These should be uploaded for use next year. This will enable more equal comparisons to be drawn between the 2 options as historically fieldwork has gained higher marks than centre based tasks. All centres considering fieldwork for 2015 submission must download new versions of the tasks. Even tasks they have originally submitted. These tasks are available for other centres to use if they do not wish to put in an original submission and centres are encouraged to check through interchange first. They have all recently been overhauled to make sure that there is consistency across the tasks. It should be noted that fieldwork must have been OCR approved. A very small number of centres had their candidates doing work that had not been finally approved and was still awaiting changes; a few had fieldwork that had not been submitted for any feedback at all.

For the 2014 submission of field work centres were asked to send written information of the rock types candidates will be describing as well as photographic evidence and copies of base maps etc. This will play a similar role to the teacher trial data in centre based tasks and will create a benchmark for comparison. Very few centres sent this information, despite if being flagged up in last year's report and so the moderators had to chase it up. Please make sure this information is included for 2015 as it helps moderators who may not know the site in question.

Most centres had the required 50% of marks awarded for A2 tasks, although a few did not and this has been highlighted on the centre report. One of the main weaknesses was the lack of detail in the fossil work and in rock descriptions. Many centres submitted work with barely any detail of rock/fossil descriptions yet full marks often 2 or 3 /20 had been awarded. Many centres need to get candidates to describe their fossils/rocks in a lot more detail and label diagrams more clearly for A2. It can be useful to consider the type of detail required for a centre based task and aim for a comparable standard. If centres have never tried these tasks it is worth looking at the papers and mark schemes uploaded onto interchange for the next year, as a guide to the amount of detail required.

For rock descriptions consider the requirements for a centre based task; often a mineral name with a reason for identification could be required for 1 mark. If sandstone is described it would be reasonable to expect a comment to explain the presence of quartz in the rock, with a reason to show how the quartz was identified, e g hardness testing. Comments on grain/clast size (numeric for the quantitative component), shape and sorting would be a reasonable expectation. Also comments on colour, cement and composition of the whole rock. If all is in order, this could then fulfil a "detailed" requirement. Many candidates are very familiar with the 3 S's and 3 C's, an easy way to train candidates in detailed rock descriptions. Likewise the fossil descriptions need more detail, especially for Brachiopods and Bi –Valves: a clear distinction needs to be made to show how each was identified, as they can have many similarities when viewed in a rock.

Fossils sketches should not be of textbook versions. Some centres included sketches of a crinoid/ammonite, which was taken from the text and was instantly recognisable.

A good way of get A2 marks into fieldwork besides using fossils is to focus on economic uses of rocks. Here candidates should be encouraged to identify properties of the rocks visible or testable in the field and link this to possible economic uses. Alternatively if the site is coastal issues to do with coastal erosion could be explored. Field evidence for relative dating using things such as way up structures and cross cutting relationships also work well. In general, these

sections were underdone compared to fossils, but when done were usually completed to a high standard. This summer a sheet was included with returned work from OCR to highlight some of the topics which could be studied for fieldwork.

Many centres used Graphic logs to cover some of the quantitative requirements. There were some excellent graphic logs evident, and most centres are now using acceptable versions. A few though are still drawing them as simple diagram of 2 or 3 beds, not to scale, and without clear grain sizes. It should be remembered that if a sequence only contains Limestone beds that a graphic log is not going to show any variation in the beds and as a result a different technique might be more suitable. A few centres had outlined a good fieldwork plan in their submission. Yet when submitted, it appeared that up to 7 marks were still sometimes being given for the marking of rather basic points onto a log. This was highlighted last year for a few centres and it was disappointing to see this issue occurred again. Logs are fine for a certain number of marks but no tasks in centre based papers will usually carry more that 4 marks: this should now be the same for fieldwork

Field sketches for large areas in general were much improved this year and some excellent ones were seen with plenty of detailed labelling and good scales indicated. Fossil sketches though are lagging behind in quality and it would be a good area in which to focus candidate's attention for next year.

For some centres it was difficult to work out the mark scheme used and sometimes what the candidates wrote was not easy to match up with the mark scheme. It is permissible to use task numbers on the mark schemes and on student work. In a few cases where teachers wrote nothing onto the candidate work, it was difficult to work out where the marks fitted and to see how the marks were awarded.
The official task sheet with the OCR T number on it must be sent to the moderator to prove that is it an approved task.

The best centres were those where the marks on the candidates work could be clearly matched up to specific parts on the mark schemes.

For a very small number of centres some candidates had almost word for word the same for every site suggesting that they were taken around en masse and shown the same features. For example, headings such as "the Andesite dyke" This is a concern as the fieldwork is meant to test field skills rather than implicit geological knowledge. It is also unlikely that every candidate in a centre at the same point in his or her fieldwork will identify this rather unusual rock in a dyke as it is volcanic. For example a fossil should show sketches with descriptions of what is seen, not text book standards for the group in question. If a feature cannot be seen/is not present it should not be labelled. However it is perfectly acceptable to go over the general geology of the area to put the site into context. The type of information given prior to the task should be consistent with the "grey box" information, which is published on interchange for the Centre based tasks. Candidates MUST work independently for this part. The only time they could work together is if for example two ends of a measuring tape need securing. Centre based tasks are not done communally, fieldwork should not either.

A very small number centres are still giving candidates too much guidance; e.g. using guidance sheets of A4/A5 booklets, or paper with specific task boxes drawn in for candidates to sketch or write in, instead of using notebooks, which was favoured by most centres. There was concern that this constituted too much help especially as there were some leading suggestions. Rather than stating, "describe the Limestone, sandstone and siltstone" it could be re worded to ask candidates to describe the different sedimentary rocks found at the site, thus leaving it up to the candidate to identify the rocks. Some centres are STILL telling candidates the names of rocks and structures they will see, this is completely unacceptable at A2. This was raised last year and the same centres in some cases are still doing this, which is unfair to centres where stricter standards are being applied.

Evaluative tasks:

In general these were completed to a higher standard than previously and the mark scheme was often clearly applied.

Comments on individual tasks:

EV 1;
This was a new task this year and like the new centre based task proved to be the least popular. Often if centres completed more than 1 task, this task gained the lower mark.

The main issues were found within a small number of the questions. In general the mathematical questions were carried out correctly, although care should be taken over figures being rounded up correctly. It was the more interpretative ones which caused issues:

Question 1c) did cause problems as many candidates were trying to link their answers to oil in the rocks rather than describing rock properties. Allowance was made for this in the additional guidance column.

The question requiring the oil traps to be marked on did cause issues; the acceptable answers were given in the mark scheme and additional guidance column. Many candidates were aware of density values in the salt and dolerite but not all gave full detailed explanations as to why these variations occurred.

The geological map in general was done in very good detail although it should be noted that virtually no candidates identified the salt layer as occurring first. As a result the first point on the mark scheme should not be awarded, as the sequence of sedimentary rocks was incorrect.

There were some cases with this paper where incorrect responses or responses not on the mark scheme were credited. It is worth re-iterating that in these cases OCR should be contacted to discuss concerns over answers that are considered to be correct.

EV2;
This was equally popular as the final evaluative task. Most of the issues were from just a couple of questions, the same as last year.

The question on the Brachiopod morphology gave detail as to which answers were acceptable. A few centres credited other points not on the mark scheme.

Candidates found the question of the Graptolite preservation quite difficult to gain the mark. Most gave a good reason, but fell down on the second or repeated the same point. Similarly the question on the creation of cruziana tended to have candidates just referring to walking and not to how they are made.

The photograph showing ripples marks was much better identified this year.

EV3;
This evaluative task tended to produce the highest marks and had the fewest problems. Plotting graphs will always have a comment on the mark scheme about how many points are allowed to be “inaccurate”, if more points are not accurate then full marks cannot be awarded. Axes also usually carry a mark, so full marks cannot be awarded if they are absent. It is useful to encourage candidates to make small crosses on the paper rather than large. The additional guidance column made it clear that candidates could be credited for whichever way round they plotted the axes.

The geological map showed some really good skills are being developed and many candidates wrote in exceptional detail here. A few centres though are still struggling to apply this mark scheme. It is vital to read the additional guidance column to see how much detail is required for this task. In order to earn 4 marks a lot more detail than usual was required; so reference was made to the types of intrusions and faults, the fold also needed significantly more detail than map questions when fewer marks are available. In general this question was answered well.

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