GCE

Geology

Advanced GCE **A2 H487**

Advanced Subsidiary GCE **AS H087**

Report on the Units

June 2009

HX87/MS/R/09

Oxford Cambridge and RSA Examinations

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REPORT ON THE UNITS

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General Comments

There were some excellent scripts and these candidates demonstrated very good subject knowledge and were able to express themselves clearly and concisely using good technical terminology. Performance at the top end was excellent with a significant number (6%) of candidates gaining more than 50 marks out of 60. Very few candidates gained less than 10 out of 60 which indicates well prepared candidates. This is the second time that the new specification has been assessed and it would appear that candidates are prepared for the new parts as well as the more familiar aspects of the specification. There was no evidence that time was an issue – almost all candidates attempted the extended question.

In addition:

- Some candidates need to pay far more care and attention to the quality of their diagrams especially of the plate margins. Poor handwriting and spelling continue to be issues for some candidates and they should be encouraged to learn the correct spelling of key geological words and terms. This is particularly important in the new specification which has two marks reserved for the correct spelling of specific terms.

Comments on Individual Questions

Q 1 This question gave a wide range of marks with some students gaining full marks. Students averaged about 9/15.

a) (i) The majority of candidates knew the location of the trench and fold mountains although many had the trench too far away from the coast. Most candidates opted for the trench and mountains along the coast of North and South America. A few candidates indicated the trench in the Caribbean or Aleutian islands. 25% of students gained zero marks.

> **Teaching Tip**
> It would be useful for candidates to have an outline map of the worlds on an A3 sheet that is then coloured in with all the significant tectonic features. The marine features tend to be difficult for candidates to locate so a map with Mid Ocean Ridges, island arcs, trenches, hot spots would be of great use

(ii) Half the candidates knew the answer. Candidates tended to struggle with locating high and low heat flows. Many candidates knew that high heat flow was found in active mountain ranges and volcanic areas. Locating Mid Ocean Ridges accurately proved difficult for many candidates. A number of candidates did identify New Zealand and Hawaii as areas of high heat flow. Candidates do need to be more precise with their shading making sure that trenches are just offshore and that fold mountains are completely on land and not partly in the sea. In general locating the high and low heat flow areas accurately was the main problem.

> **Teaching Tip**
> Have a similar A3 map as mentioned above but with red and blue pencils colour in areas of high and low heat flow

(iii) Although candidates may have had difficulty locating areas of high heat flow accurately 60% did know why the high heat flow existed often indicating it related to partial melting, rising magma or volcanic activity.

(iv) Candidates tended to be better at locating low heat flow areas in the oceans whilst locating cratons tended to prove difficult. See the comments for (ii) above.

(v) Surprisingly few (45%) candidates knew the reasons for low heat flow which could include:

- Being away from a plate margin, within the centre of a plate
- cold sinking convection currents at convergent plate margins
- old (stable) crust or thick crust
- no igneous activity or rising magma

a number of candidates mentioned cold water over a trench which is not really the explanation it is the cold sinking convection currents

b) **(i)** Many candidates (68%) gained at least 3 of the 5 marks available; however the standard of drawing was generally poor. These are diagrams that all candidates should know thoroughly and be able to reproduce in an examination. Often little care was taken in placing the various features in the right location and labelling was careless – marks were therefore lost unnecessarily.

> **Teaching tip**
> Because the question asks for an island arc candidates should start by drawing the sea level (using a ruler). This will help candidates to lay out the rest of the diagram. Because the question asks for oceanic plates, make sure candidates emphasise the shape and thickness of a plate, not just the crust. Candidates should take care with the precise placement of the earthquake foci on the top of the descending plate. Convection currents are a cause of the converging margin, so candidates should take care to place them in the appropriate position on either side of the descending plate.
> Candidates should draw fully annotated A3 sheets for each variant of plate margin marking on all the significant features. Candidates should be encouraged to reproduce these under timed conditions on a regular basis prior to the examination.

(ii) Mostly candidates (50%) knew the reason for the occurrence of earthquakes and achieved both marks. However, there was confusion about the terms stress, energy and friction, which were often used synonymously. Candidates should be encouraged to mention frictional resistance to the subducting plates which built up stress. This stress is then released as seismic waves.

c) While most candidates could name the methods that are used, there were a lot of incorrect explanations. For example, base isolation systems allowed the building to "move with the earthquake" whereas the aim is for the ground to move with the building remaining more or less stationary. A number of candidates wrote vaguely about "shock absorbers" without any detail. Explanations of counterweights, flexible structures and pyramid shaped/wide based buildings were often very good. A number of candidates included diagrams which often helped the explanation.

> **Teaching tip**
> Encourage candidates to add annotated diagrams to answers even if not asked for specifically ion the question as they can often gain the mark which the text alone may not warrant.

Q2 Candidates found this question relatively straight forward averaging about 9/13. No student gained below 4 marks and 4% of candidates gained full marks. The divergent plate margin question was straight forward as was the plotting of the graph. Calculating spreading rates remains a difficulty for many.

a) **(i)** Most candidates (73%) gained at least 3 marks for this straight forward diagram of a divergent plate margin. The main error occurred as a number of candidates tended to be marking the volcanoes at a distance from the axial rift. Candidates must make sure that they draw convection currents that clearly rise beneath the ridge/rift and divergent at the surface, many candidates drew small convection cells, this should be discouraged. See comments on 1 b (i) for teaching tips.

(ii) Most candidates knew about the role of convection currents but were often vague about exactly how they operated by diverging and pulling the plates apart under tension. Many were also aware of the role of rising magma but again could not give a detailed description of the forceful intrusion of magma pushing plates apart. An increasing number of candidates are aware of ridge push and slab pull and so gained credit although detailed understanding of the processes were often lacking.

b) **(i)** The majority of candidates (96%) gained full marks for plotting the graph showing spreading of the East Pacific Rise. The only problems were that the lines and points were often scruffy and sometimes the line did not go through the origin.

(ii) Calculating rates of spreading remains difficult for many candidates. Only 37% of candidates could calculate the rate correctly with clear working shown.

Teaching tip
Candidates should practice the various types of spreading rate calculations including tabulated data as in this case. Candidates may need to measure distances on a cross-section and work out the age of the rock from magnetic stripes as in May 2007. Other examples of such calculations are to be found in June 2001, January 2002, May 2002, May 2003, May 2004, January 2007, May 2008.
When showing working candidates ideally should show the formula and then substitute the numbers clearly in an organised way such that the examiner can follow the working.
Rates are normally between 1 and 12 cm/year

(iii) Most candidates (64%) were aware that a steeper gradient indicated a faster spreading rate.

c) Only 33% of candidates knew the correct term for the composition of oceanic crust. Many candidates described the various rock types to be found in oceanic crust including the sedimentary rocks. Candidates were expected to know that the igneous rocs are mafic (basic) or perhaps basaltic. Rock types were not expected for composition.

Q3 Question 3 produced a range of marks averaging about 9/18 with only 1% of candidates gaining full marks. The structural questions especially regarding stress, strain and competency proved difficult.

a) Relatively few candidates could define stress and strain with only 25% gaining full marks. A number of candidates would describe stress as a compressive force and strain as a tensional force indicating no real understanding. Strain as the "effect" is too vague an answer.

> Teaching tip
> Make sure that candidates fully understand these terms (and any other term in italics in the specification as they may well be asked to define them).
>
> **Stress:** the force per unit area which acts on or within a body.
> (This is similar to pressure. Think of stress as a directed force due to earth movements, and pressure as the result of overlying air, water or rock)
>
> **Strain:** the change in shape or volume of a body in response to the stress acting on it.
>
> **Competent:** a rock which folds without a change in its original thickness. Tends to form joints.
>
> **Incompetent:** a rock which flows and changes its original thickness as a response to folding; the flow may lead to the development of cleavage.

b) **(i, ii)** Many candidates had some understanding of competent but less so for incompetent. The relevant rock types were better known. See teaching tip above.

c) **(i)** faults were generally well done with 36% gaining full marks; common errors included shear/transform (for
strike-slip), dip slip (for thrust / reverse / normal).

(ii) 54% of candidates knew the position of the footwall. However, as is often the case many labelled the fault plane and so gained no mark. An arrow should clearly indicate the appropriate side of the fault.

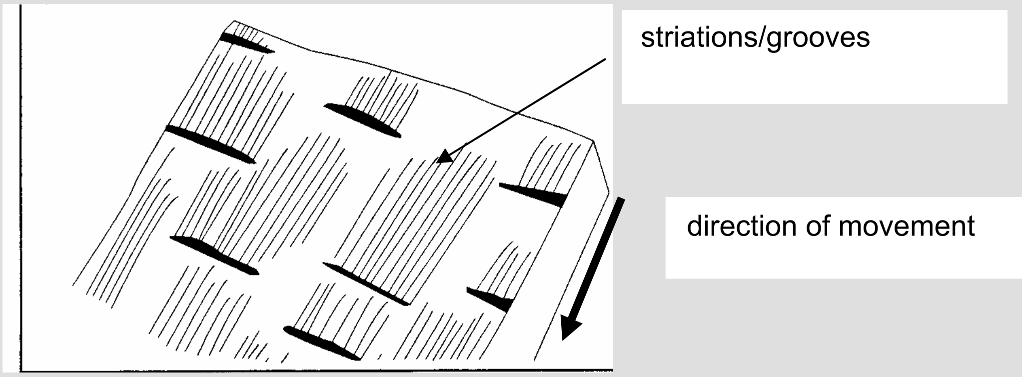
(iii) Many candidates knew the kind of stress involved with forming the faults with 66% of candidates gaining full marks

d) **(i)** slickensides were often quite well done (64% of candidates gaining at least 1 mark), but often lost a mark for a poor or unlabelled diagram or failing to say that they are formed by fault movement. Answers were often vague or ambiguous, referring to 'rocks rubbing over each other', or 'pieces of rock moving passed each other'.

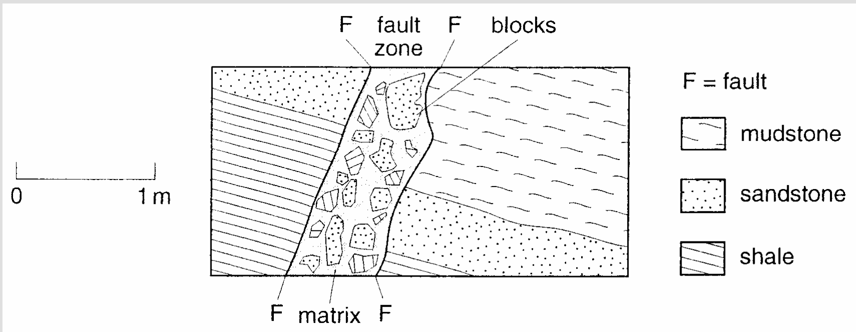
(ii) fault breccia was less well done (with 58% of candidates gaining at least 1 mark) than slickensides; poor diagrams or failing to combine the idea of fault movement causing rocks to be broken was a common failing of candidates. Quite a few candidates did not respond to this question.

Teaching tip
Questions about slickensides and fault breccias always prove difficult for students and so teachers need to emphasise this to candidates and try and make it a strength.
The question refers to fault planes. Candidates should make sure that their diagrams clearly show the fault and the written answers refer to movement along the fault plane. Breccias and striations can be formed in more than one way, so candidates must be clear which process they mean.
Below are the kind of diagrams candidates should aim for:

SLICKENSIDES



FAULT BRECCIA



Q4 This is a new part of the specification and it appears that candidates have been well prepared. Candidates averaged 4/6 marks with 15% gaining full marks.

a) **(i)** One third of candidates knew both elements, one third just one and a third of candidates did not know either of the elements. Very few candidates had difficulty spelling the elements.

(ii) Almost 90% of candidates knew two of the terrestrial planets which is encouraging.

(iii) This proved quite difficult for many candidates with 25% of candidates gaining no marks. It is well worth candidates being clear about the key characteristics of terrestrial planets and gas giants.

Q5 This question provided a wide range of responses and marks with 7% of candidates gaining 0 marks and 4% gaining full marks. The average was about 4/8.

Candidates tended to have a very sound understanding of the composition and state of the core including the names of the discontinuities. The mantle in contrast was less well known. Most candidates knew the mantle composition but the detail of the structure including the lithospheric part of the mantle and the asthenosphere were poorly understood. Many candidates knew that part of the mantle was rheid/partly molten but few tied it down to the asthensophere. Some candidates knew all the depths but many appeared to guess or did not know them at all.

Teaching tip
It is recommended that candidates have an A3 sheet which is fully annotated with the crust, Moho, lithosphere, asthenosphere upper mantle and lower mantle marked on along with the appropriate depths. This should then also have the inner and outer core. The compositions of the layers also need to be indicated.

In an extended prose question candidates should be encouraged to use the wording of the question to construct your answer. In this case describe the depth, physical state and composition of the mantle, and then depth, physical state and composition of the core.

The lithosphere includes the crust and the uppermost mantle, it is solid and rigid.
The asthenosphere included the next layer of the upper mantle. It is rheid due to partial melting.
The rest of the upper mantle, down to a depth of 700 km is solid.

F792/01: Rocks- Processes and Products (Written Examination)

General Comments

Candidates had a good grasp of the geological concepts and generally scored well on this paper with some excellent papers. Candidates often showed a good grasp of geological terminology. Many candidates showed much improved spelling of technical terms, though confusion between the words ‘sediment’ and ‘cement’ and ‘garnet’ and ‘granite’ led to marks being lost. There was a significant weakness with candidates’ knowledge of metamorphic rocks. A minority of students could have gained better marks with better exam technique as there was evidence that some dropped marks despite having good knowledge in some areas. There was no evidence that the paper could not be completed on time.

Comments on Individual Questions

Question 1

1 Candidates were generally successful in answering this question but definitions of the term ‘rock’ were sometimes unclear and the need to explain processes causing mineral alignment was quite often ignored

(a) Some candidates misunderstood the question, which asked for ‘broad rock groups’ and wrote the names of specific rocks found within the groups – igneous, sedimentary or metamorphic. Though the mark scheme credited named rocks, answers which just stated ‘mafic’ or clastic’ were too general to be awarded marks.

(b) **(i)** Well-answered though candidates found it easier to define the term fragmental rather than crystalline.

(ii) Less well answered even though a wide range of definitions were allowed.

(iii) Few candidates gained both marks as this part question proved to be more challenging. The question required an explanation and candidates often did not focus on the processes involved in metamorphism. A simple statement like ‘directional stress’ or ‘pressure during folding’ was all that was needed by way of explanation. Most marks were awarded for minerals aligning perpendicular to the pressure. The majority of the candidates gave answers which were too general to gain marks. A process needs to be <u>named</u> and <u>explained</u> to earn marks. There was often confusion regarding the orientation of platy minerals with respect to stress direction. Few candidates stated correctly that the minerals will align perpendicular to stress direction.

(c) **(i)** Most candidates identified F correctly as a sedimentary rock, but some thought that E was metamorphic.

(ii) This was generally well done and if the drawings were wrongly identified the candidate was not penalised twice. Some had a tendency to say why they hadn’t chosen another rock group, rather than say why they had chosen the one they did. Some candidates were let down by poor understanding of terminology. Terms often confused were ‘porphyroblast’ instead of ‘phenocryst’ and ‘grain’ instead of ‘crystal’. Successful candidates were those who could incorporate the thin section label information into their answers. Many gave “two stage cooling” or similar wording as part of the answer, few commented on the random orientation of the crystals

(iii) Mostly done well and the fossils and the cement were given as reasons by almost all.

> **Teaching Tip**
>
> **Alignment of minerals**
>
> Use dry spaghetti, or pens and pencils from students own pencil cases to represent rod shaped or platy minerals. Drop them onto the bench so that they fall in random order.
> Use two rulers and move them towards each other, either from the sides or from top and bottom to represent directional stress, showing how the minerals line up perpendicular to the stress direction.
>
> **Definition cards**
>
> Make glossary cards for different topics and use them in pairs for memory games or playing snap. Take two sheets of A4 card and divide each sheet into 15 rectangles (3 across, 5 down). Use each section on one sheet to write a definition for one key term "eg large crystal surrounded by finer groundmass". In the corresponding space on the second sheet write the name which has been described "eg phenocryst". Cut up both cards and use for games.

Question 2

2 (a) (i) A few candidates confused suspension with solution, but most were able to define the term properly.

(ii) Many candidates realised that variation in the energy of the current was the key for this explanation. Some stated that an initially large grain could become smaller during transport and this would affect how it was carried. Some candidates did not make reference to either river *velocity* or *energy.*

(iii) Responses were quite mixed. Some candidates did not describe a difference, merely stating what a wind transported grain or an ice transported grain would be like. A description of the difference between grains needs reference to both grains but not all candidates compared ice and wind transported sediment and so lost marks. Others described a difference but did not give a reason that explained the difference.

> **Teaching Tip**
>
> **Suspension and Solution**
>
> Place a tablespoon of mixed sediment into a beaker of water and stir it up. The heavier material will sink but the finer material stays within the column of water – it is in suspension.
>
> Add a teaspoon of salt to a beaker of warm water. Watch it disappear –it is in solution.

(b) **(i)** Where rivers erode was very well known.

(ii) Some candidates stated that laminations were found in meandering river deposits. These structures are found in flood plain sediments rather than channel deposits.

(iii) The majority of candidates had the idea of the movement of the meandering river. Though only the strongest candidates understood how cross bedding forms. Often not well explained, most marks were for indicating the river moved or for concept of superposition

(c) This part question was poorly answered. Most candidates named the rocks in a fining upwards sequence, though some candidates described changes in mass eg heavy particles to light particles rather than changes in sediment from gravel to sand to clay. Only the strongest candidates were able to link decreasing grain size with the gradual reduction in river velocity. Very few gained three marks as many candidates described graded bedding, so got no more than two marks. Many didn't relate sequence to continuing decrease in velocity. Very few candidates able to relate the coarse deposits to the channel, the sands to the slip off slope, and the mud to the floodplain. Some candidates recognised the relationship of grain size to energy

Question 3

3 Most candidates scored well on this question. Many candidates were successful with the graph and the calculations although some did not know how to calculate the cumulative mass for the sediment sample and others found describing the difference between sediments difficult.

(a) **(i)** The majority of candidates were able to calculate the cumulative frequency, but a minority seemed to have no idea and entered apparently random numbers in the table. Candidates who entered incorrect data were still able to gain credit for plotting it and drawing a curve, provided it was 's' shaped. generally graphs were well plotted.

(ii) Candidates gave good definitions of sorting. The main mistake was the inclusion of shape in some definitions.

(iii) The correct calculation method and accurate answers were common though some candidates had no idea how to find Φ16 or 84.

(iv) Some candidates used the coefficient of sorting to describe the difference in sorting. It was enough to state that H is better sorted than G.

(v) Candidates must take care to name specific environments when asked and not write too generally eg continental shelf, continental slope, abyssal plain and turbidity current were not accepted for 'deep sea'.

(b) **(i)** Only the strongest candidates used the detail from the thin section labels in their answers. Marks were usually for correctly naming the rock type but not then explaining the environment of deposition.

(ii) Many candidates lost marks for incorrectly stating 'calcite', and in some cases 'calcite sediment', instead of 'calcite cement'.

(iii) Most candidates understood that iron oxide cement relates to desert conditions but candidates often did not attribute well-rounded grains, and the sediment being well sorted, to wind action to earn the second mark.

(iv) Most candidates got a mark for iron oxide cement, but not often for anything else. If they did identify specific features of desert sands, they were not then explained or analysed.

Question 4

4 (a) (i) Candidates who used 'transport' as the first process tended not to do well with the rest of the answer. There was some confusion about where 'crystallisation' and 'recrystallisation' should be used. Responses were very variable. Candidates found it difficult to recognise this as a rock cycle diagram and then place the labels correctly.

(ii) There were some clear descriptions of compaction although not everyone described what the 'pressure' was. Something that meant load pressure was needed. Just 'pressure' is too imprecise

(iii) Often well described but in some cases it tended to be a repeat of compression, with more squeezing out of fluids and greater reduction in pore space. Minerals in solution in percolating pore waters and precipitation to form named mineral cements all gained credit here. Candidates frequently seemed to not understand the idea that percolating fluids carry dissolved minerals, that can precipitate out around the grains Candidates should take care to state that minerals are 'carried in solution' and 'minerals precipitate in pore spaces' rather than 'evaporate'.

(b) (i) This question was poorly answered with many candidates not understanding the process of metamorphism. Common incorrect answers were 'andesite' instead of 'andalusite' and 'hornblende' instead of 'hornfels'. There was some confusion with regional metamorphism and vague answers that did not give the index minerals or the characteristics such as crystal size or even the rock name.

(ii) Some candidates drew "brick wall" style diagrams, the descriptions were often quite good with "metaquartzite" or "granoblastic" common terms used. A noticeable number didn't label the diagram.

(iii) A number of students had problems distinguishing between baked margins and metamorphic aureoles. The answers should focus on scale.

Question 5

This question covered more new AS content on Bowens Reaction Series and was often answered very well.

5 (a) (i) In a minority of papers the arrow to show increasing temperature pointed down instead of up.

(ii) The minerals of Bowens reaction Series were well known, even the weakest candidates got three marks, with three or four minerals in the correct order

(iii) Many had the idea that there is a variable proportion of Ca to Na, though few could explain why this was occurring.

(b) (i) Candidates found this hard to answer, quite a few were able to identify the minerals found in mafic rocks, but not able to give reasons.

(ii) This was often well answered. Marks were only awarded for explaining data provided in the table. There was some poor exam technique which let candidates down as they did not give a comparative answer eg 'quartz has a hardness of 7', rather than 'quartz is harder than feldspar' ……

(c) (i) Most candidates gave the correct answers. A few students were confused by the black and white photograph and did not realise that the descriptions were there to help them.

(ii) Candidates often seemed to get one of the two minerals correct. Poor exam technique led to answers that lacked detail (e.g. 'mica' or 'feldspar' instead of 'muscovite mica' or 'plagioclase feldspar'). The mineral table on the previous page included the full names.

(d) This was well-answered by the best candidates and a few very good candidates described how an intermediate rock can form. Many had the idea of olivine / more dense minerals sinking, but did not gain the other marks.

Question 6

Students must write in continuous prose, not just in lists or diagrams.

A number of students described contact metamorphism instead of regional and gained little credit for their answers but were awarded marks for correct naming of index minerals common to both types of metamorphism. Those that described regional metamorphism, often scored very well and often wrote answers with information well in excess of the ten marking points. These answers had a very clear and concise understanding of regional metamorphism using all the correct terminology and rock / index minerals. Weaker candidates did not state that regional metamorphism is caused by both temperature and pressure.

Diagrams did help some students gain marks they wouldn't otherwise have got. Textural terms were used frequently, but not index minerals.

Teaching Tip:
Produce a table to compare index minerals, metamorphic grade and rock types for regional and contact metamorphism (when the parent rock is shale).

Question 7

7 This was often very well answered. Most candidates followed the structure given and were awarded maximum marks. Some candidates lost marks for writing general statements, such as 'strato volcanoes have high viscosity' and not explaining why. Most candidates had a good knowledge of the two types of volcano with a minority swapping some of the features of one type for the other (e.g. silicic magma for a shield volcano). Some were using the term 'high viscosity' to mean 'runny' rather than 'sticky'. Few described the reason for viscosity of lava in relation to its composition. Many candidates described the products well, but did not quantitatively describe the width / height / steepness of slopes for each volcano

The majority of candidates were able to draw a diagram of each, although only a minority were drawn with sides at the correct angle and accurately labelled. Sometimes it was not possible to determine whether the volcano geometry drawn was that of a strato or shield volcano.

F793 Geology Coursework

General Comments

In general the marking was accurate or at least within tolerance levels. Most marks were lost through the questions that required a labelled sketch. These were often poorly done and lacking in measurements and labels. Some of the printing was of poor quality, which must have hampered candidates trying to identify rock textures and structures. It is recommended that centres try to use colour photocopies for all photographs or to project them on to a screen where this is not possible..

It was good to see so many staff helpfully annotating work and the mark schemes were well used. Useful annotations usually consist of ticks and crosses against responses to show where marks have been earned or not earned. Specific phrases could also be included to confirm the reasoning behind a mark being allowed. Teachers do need to use 'professional judgement' where answers are not covered specifically in the mark schemes. The script MUST then be annotated for the moderator to be able to see why the mark has been awarded.

Teachers should encourage candidates to use the specialist scientific terms used in geology. Moderators often saw the correct thoughts expressed, but using incorrect language. It is something that needs to be addressed before A2.

The 'on line' mechanisms worked reasonably well. Some centres are very slow to respond to e-mails and electronic CWAMEND forms. In a few cases over 3 weeks elapsed between the moderator sending a CWAMEND form out by e-mail and the centre returning the agreed revised marks to OCR.

The guidance in the handbooks for fieldwork and tasks is very helpful and worth downloading from interchange. All the forms are also available.

Centres are strongly encouraged to send to the moderator a copy of the Centre based / fieldwork and evaluative summary form which is in Excel format, downloadable from Interchange. Centres need to put in all of the marks achieved by each candidate; the form will then automatically fill in the totals using the best marks. Some centres did a single task for all candidates so that just one mark was submitted while others gave candidates two or even three opportunities.

Cand no	**Surname**	**First name**	**1**	**2**	**3**	**1**	**Centre-based *or* Fieldwork(20)**	**1**	**2**	**3**	**Eval (20)**	**Total (40)**
2345	Bloggs	Joe	5		10	15	15	**12**	14		14	**29**
2342	Jones	Jenny	12	14	10	8	14	13		9	13	**27**
7653	Smith	Sarah		12	15	**12**	15	12		9	12	**27**

Centre Based tasks
Centre Based tasks MUST always be accompanied by the teacher's notes on the experiment and the results of a trial run through. This is to enable the teacher to know what it is reasonable to expect, and also allows the moderator to make a judgement as to the validity of the results produced. Most centres did this, although one or two did not, and this was commented upon in the 'Moderator's report to centre'.

Drawing and labelling geological features is an essential geological skill that may be needed as part of the centre based task or a fieldwork task. No marks are given for 'artistic skill' and candidates who are not 'gifted' in this way should be encouraged to produce more of a 'diagram' than a 'sketch'. If for example, candidates just picked out the main bed of rock affected by the fault, rather than try to draw too much artistic detail this would make it much simpler to measure throw and angle of dip etc. This is a skill which centres should practise – encouraging candidates to draw from photographs.

Centre Based Task 1
This was the most popular of the centre based tasks and showed a good range of marks.

Q1 A wide variation in 'sand' was used. This is one reason why it is very important to include the teacher's trial results.
In general (a) and (b) caused no problems to candidates.
c) Many candidates referred to 'candidate error'! Errors should be based on scientific explanations such as packing of sediment or the effect of filter paper etc.
d) No issues.

Q2 a) Well answered. Some candidates did not put the dyke under the unconformity. Dips were in general measured accurately.
b) Part iii, few candidates gained full marks for this. Higher order words like 'concave' and 'laminations' were often missing.

Q3 Candidates produced answers of a very variable quality. Better candidates produced more of a diagram than a sketch, which enabled them to show the faults, dips and throws. About half the candidates recognised it as a 'graben' type structure. Some candidates took measurements from their own drawing, which was accepted by the moderators.

Centre Based Task 2
This was the least popular of the tasks with few centres confident with the practical element.

Q1 There was considerable variation in results for this experiment between centres, so moderators accepted most results as being valid. Pattern and hazards were well described by candidates.

Q2 Candidates produced some good answers to this section.

Q3 Some candidates were unsure about whether the dip of the fault is measured from the horizontal or vertical. Footwall also caused some confusion. Most identified extension / tension as forces that formed the fault. Saying 'earth movements' was not considered good enough for a mark. Part iii had some excellent sketches showing two faults, throw etc

Centre Based Task 3
This was the second most popular exercise.

Q1 Was well done by candidates, with no major issues. Some candidates did calculate the cumulative % - even though this was not asked for – it was decided to allow marks for this. Candidates did need to state a colour of the sand 'frosted' on its own was not considered enough for a mark.

Q2 No problems for most candidates.
c) Some confusion however, over the formation of breccias.

Q3 Most candidates had no problems identifying the unconformity, although quite a few struggled to give reasons in language that qualified for a mark.
d) Slickensides was spotted by about half the candidates attempting this question. Both movement and scratching are required for the mark in part ii.

Q4 Words like *recumbent*, *nappe* and *thrust fault* were all essential for full marks. Candidates should be encouraged to use words like *competent / incompetent* for describing such features.

Fieldwork
In this first year the numbers who used fieldwork were similar to those submitting CB1. A range of fieldwork tasks for sites around the country is now available on interchange so that centres can use any of these.

In general centres produced very good fieldwork. Clearly a great deal of thought has gone into fieldwork exercises to make them appropriate and enable candidates to have the opportunity to gain the higher level marks. Centres are reminded that each field activity must be trialled before being undertaken by candidates and that the mark scheme must be approved by OCR before the fieldwork is undertaken. Changes may be made due to unforeseen circumstances on the day and details of these changes should be notified to OCR via e-mail, remembering to include the centre number. It should also be flagged up on the mark scheme, e.g. using a different colour pen to show if a particular section were impossible perhaps due to bad weather making the site dangerous.

Do try to make it so that the task sheet (that the candidates follow in the field) follows the mark scheme. This helps the candidate, teacher and moderator.

Teaching tip
Task 1 is at Location 1; a candidate has to measure beds, describe rocks, measure dips, draw a graphic log. Then goes onto Task 2 at Location 2, where they measure the orientation of crinoid stems and record as a table, and so on. Write the mark scheme in this order so that the candidates methodically works through their tasks and then the teacher and later moderator can easily follow it, as field notes, especially if made in the rain, can be difficult to read!
It can be useful to add an extra column onto the OCR mark scheme sheet and then this gives the teacher space to write in the mark awarded and any other relevant comments for the moderator. It also acts as a good summary and makes it much easier to add up the final scores.

Diagrammatic sketches of features such as faults, folds are an excellent way of demonstrating geological skills – label and measure everything!! Some excellent graphic logs were produced, although some centres called sketches with measurements 'graphic logs' which they are not. Candidates can be given blank graphic log sheets to use in the field.

Teaching tip
If the centre does not have a good bank of geological photos use internet images and project an image onto a whiteboard. The teacher can then demonstrate on top of the photo how a sketch could be done and the sort of labelling required. Candidates could then be set further exercises to test this skill. Much easier to do field preparation before the fieldwork and often dryer and quicker than outside!

Mark schemes need to be broken down to show where 3/2/1 marks were awarded and this must be made clear. Work for this should also only be done in the field and sheets / notebooks must be collected in as candidates leave the fieldwork site where the assessment was done. Some work seemed far too neat to have been done outside and was only allowed as the teacher sent a covering letter to explain that the weather had been so wet that it was physically impossible for the work to be completed outside. Some of the best work seen by moderators was on the 'scruffiest' pieces of paper, which shows it is all about doing good geology not appearance. Some locations do have nice convenient flat rock surfaces for candidates to work on eg Sannox Shore, Arran. If the teacher is concerned that very neat work may not look like it was done in the field a note to the moderator to this effect is recommended.

A few centres allowed candidates to do the fieldwork task in their usual field notebooks. This is the equivalent to bringing notes into an examination and is not permitted.

If new notebooks are used, please just cut out and send in the pages used and not the whole book.

Some centres are sending all their field notebooks; these are not required, please just tear out the relevant pages.
This is especially useful if the same notebook is to used on another piece of field work, as the candidates should not have access to work already marked.

Evaluative tasks

All candidates had to complete one of these tasks so there was less variation than for the centre based / fieldwork tasks.

Evaluative Task 1

This was the least popular task and the only one that was directly linked to a CB task.

Q1 Candidates need to be reminded about using appropriate scales and labelling the lines drawn.

Q2 Most candidates spotted the relationship between temperature and distance from the heat source.

Q3 Few candidates talked about wet sand conducting heat better than dry sand.

Q4 Most candidates discussed experimental errors and were only too happy to blame themselves for these, without looking at the bigger picture of water amounts and grain size and the affect that these might have.

Q5 Most candidates spotted the anomaly.

Q6 Very few candidates talked about wet rocks being likely to be more highly metamorphosed than dry rocks for the same thermal event.

Q7 Some good graphs produced. In part b, the actual size did not matter here. Some centres penalised candidates for drawing very small aureoles – it was the ‘narrow-east’ and ‘wide-west’ that was important. Most candidates failed to connect the size of the aureole outcrop with the dip.

Q8 Most candidates made the connection between size of the intrusion and the speed of cooling; few candidates talked about ‘grade’ or mentioned specific mineral names.

Evaluative Task 2
This was by far the most popular task and gave rise to many very good papers though there was a full range of marks.

Q1 Rather surprisingly few candidates talked about phenocrysts cooling first in the magma chamber.

Q2 The rose diagram was well done by all candidates.

Q3 Most candidates were correct.

Q4 Bar charts were also accepted here, but it is worth while teachers pointing out the difference between bar charts and histograms.

Q5 Some interesting and imaginative answers were offered, the critical understanding here is *mass* of fragments and the *efficiency* of wind sorting. Flows – should have nothing to do with water.
Part (c). One mark was for the correct direction of fallout and one mark for showing the tapering pattern. Size was not considered important.
d) a valley must be mentioned here; just saying that the contours are close together was not considered good enough for a mark. Candidates therefore, need to be able to interpret contour lines and in particular recognise a valley.

Q6 Additional accepted answers included discussions about the particles ‘not being all the same’ or ‘a variety of sizes’ or ‘range of sizes’. Choosing a representative area to measure could be made more difficult due to confusion with previous eruptions.

Q7 Some good answers were offered by candidates.

Evaluative task 3
This was the second most popular task though with half the numbers who did Evaluative task 2.

Q1 Some very good answers here. Candidates are clearly happy with the concepts of stratigraphy.
bii) Few candidates mentioned both recrystalisation and the growth of new minerals.
c) About half the candidates called these *phenocrysts.*

Q2 (a) Only one mark if both distances are correct.
c) Error carried forward was allowed if candidates had incorrect calculation results.
d) Candidates needed to recognise the reasons for the turbidity flow speeding up.
e) Candidates needed to draw the diagram the right way around as the map shows a plate subducting to the left, the only exception allowed was if the candidate specifically labelled the view.

Q3 (a) One mark was available for the correct identification, the other for an appropriate reason.
(b) No marks were given just for identification a reason must have been given as well (mix of materials / angular and sub-angular etc)

Grade Thresholds

Advanced GCE Geology (H487)
Advanced Subsidiary GCE Geology (H087)
June 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	a	b	c	d	e	u
F791	Raw	60	43	37	31	26	21	0
	UMS	90	72	63	54	45	36	0
F792	Raw	100	76	66	56	46	37	0
	UMS	150	120	105	90	75	60	0
F793	Raw	40	32	28	25	22	19	0
	UMS	60	48	42	36	30	24	0

Specification Aggregation Results

Overall threshold marks in UMS (i.e. after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
H087	300	240	210	180	150	120	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total Number of Candidates
H087	17.1	36.1	57.8	75.8	89.6	100	1046

1046 candidates aggregated this series

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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