

Support Materials

GCE Geology H087/H487: Practical Skills Handbook

Version 1.1

AS/A Level Geology

AS/A Level GCE

Practical Skills Handbook

GCE Geology

OCR Advanced Subsidiary GCE in Geology H087

OCR Advanced GCE in Geology H487

This Practical Skills Handbook is designed to accompany the OCR Advanced Subsidiary GCE and Advanced GCE specifications in Geology for teaching from September 2008.

OCR will update this document on a regular basis. Please check the OCR website (www.ocr.org.uk) to ensure that you are using the latest version.

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1 Introduction

New GCE A/AS specifications in Geology have been introduced for teaching from September 2008. The new specifications are set out as units, subdivided into teaching modules. Each teaching unit is assessed by its associated unit of assessment. Guidance notes are provided within specifications to assist teachers in understanding the requirements of each unit.

This Handbook plays a secondary role to the Specification itself. The specification is the document on which assessment is based and this Handbook is intended to elaborate on the content of the specification to clarify how skills are assessed and what practical experience is necessary to support an assessment. The Practical Skills Handbook should therefore be read in conjunction with the Specification.

During their study of Geology, students are expected to acquire experience of carrying-out, interpreting, analysing and evaluating laboratory and / or fieldwork and it is important to recognise that these aspects of practical work require both teaching and continuing practice. Experience has shown that evaluating practical work and suggesting improvements to the procedures employed is a difficult skill for students to master.

2 The assessment model

Summary of the model

Practical and investigative skills developed within contexts encountered during Advanced Subsidiary GCE Geology (for Unit F793) or Advanced GCE Geology (for Unit F796) are assessed by means of **two** tasks at AS and **two** tasks at A2.

Candidates are required to carry out one of each task type:

1. Centre-based or Fieldwork task [20 marks]
2. Evaluative task [20 marks]

1. The **Centre-based** or the alternative **Fieldwork task** is practically based and candidates carry out this task under controlled conditions in the laboratory/classroom **or** in the field. The same skills are assessed whether candidates complete one of the OCR centre-based set tasks based on geological maps, photographs and data **or** carry out a field exercise devised by the centre that uses the same skills of **measurement, observation and recording** of data. This task requires both **qualitative** and **quantitative** data.

Centres wishing to use an alternative fieldwork task must ensure that it conforms to the requirements of task type 1. A sample task is on the OCR web site. The proposed task/s and mark scheme/s must be submitted to OCR for approval at least 6 weeks before being presented to candidates. If centres wish to provide candidates with more than one opportunity to carry out a field-based task then they will need to submit separate task proposal forms for each task that they devise.

2. The **Evaluative Task** is provided by OCR in a context that extends geological skills. Candidates are required to evaluate results based on field or practical data. The Evaluative task will test the ability to **analyse** and **evaluate** a range of geological data from both the laboratory and field. This may include:

- geological maps,
- cross sections of geological maps,
- analysis of field data,
- thin section drawing
- fossil drawing,
- photographs,
- graphic logs,
- rose diagrams.

All data and resources required will be supplied within the Evaluative task. There is no additional practical work for candidates to carry out.

Tasks are chosen from those provided by OCR *via* the secure Interchange website. Initially, a choice of **three** Tasks of each type will be offered. All Tasks are refreshed or replaced each year and additional tasks may be made available. Tasks are available from early June until 15 May the following year.

Candidates carry out all of their assessed tasks under direct teacher supervision.

Each task is internally assessed using a mark scheme provided by OCR *via* the Interchange website.

Candidates may attempt more than one task from each task type with the best mark from each type being used to make up the overall mark. A candidate is only permitted one attempt at each task.

For each candidate, centres will supply OCR with a single mark out of 40.

Each practical skills unit is teacher assessed and externally moderated by OCR.

Although practical tasks can be used throughout the year, entry for the AS and the A2 practical skills units is available only in the June session of each year. Marks must be sent to OCR by the 15 May.

The mark schemes supplied by OCR are based on the following criteria:

	Assessable learning outcomes
1. Centre-based or field-based Task <ul style="list-style-type: none">Candidates carry out a practical task using instructions supplied by OCR. OR <ul style="list-style-type: none">Candidates carry out a field-based task devised by centre and agreed by OCR	Candidates should be able to: <ul style="list-style-type: none">(a) demonstrate skilful and safe practical techniques using suitable qualitative methods;(b) make and record valid observations and organise results suitably.(c) demonstrate skilful and safe practical techniques using suitable quantitative methods;(d) make and record accurate measurements to an appropriate precision;(e) analyse, interpret and evaluate experimentally derived results quantitatively to reach valid conclusions.
2. Evaluative Task <ul style="list-style-type: none">This task may extend one of the centre-based tasks.Candidates may evaluate the quality of the data and procedures or geological resources such as maps, photos, logs.Evaluative tasks will not require additional data collection.	Candidates should be able to: <ul style="list-style-type: none">(a) analyse and interpret data, identify anomalies and reach valid conclusions;(b) assess the reliability and accuracy of an experimental or field-based task; identify significant weaknesses in experimental or field-based procedures and measurements;(c) understand and propose simple improvements to experimental or field-based procedures and measurements.

Downloading Practical Skills Tasks

Tasks, Mark Schemes, and Instructions for Teachers and Technicians are provided to centres (as separate PDF files combined into one zip file) via OCR's secure website, Interchange (<http://interchange.ocr.org.uk>)

Copies of the Geology *Practical Skills Handbook* and fieldwork forms are also available via Interchange and also via OCR's public website (www.ocr.org.uk).

OCR agreed field tasks devised by centres will be uploaded onto Interchange for use by any centre. If a centre wishes to alter an uploaded task or mark scheme then the amended task and mark scheme must be submitted to OCR for approval.

(PDF files require the use of adobe acrobat reader. Free copies of acrobat reader are available from <http://www.adobe.com/uk/products/acrobat>; if you use Windows 95, 98, ME, or NT, a zip program such as WinZip or PKZip can be used to extract the files. Windows XP has a built-in zip extractor.)

How to use OCR Interchange

OCR Interchange is a secure extranet enabling registered users to administer qualifications on-line. Your Examinations Officer is probably using OCR Interchange to administer qualifications already. If this is not the case, then your centre will need to register.

Your Examinations Officer will be able to:

- download the relevant documents for you by adding the role of 'Science Coordinator' to their other roles or
- make you a New User (Science Coordinator role) so that you can access the GCE Geology pages and download documents when you need them.

The website address for Interchange is:

<https://interchange.ocr.org.uk>

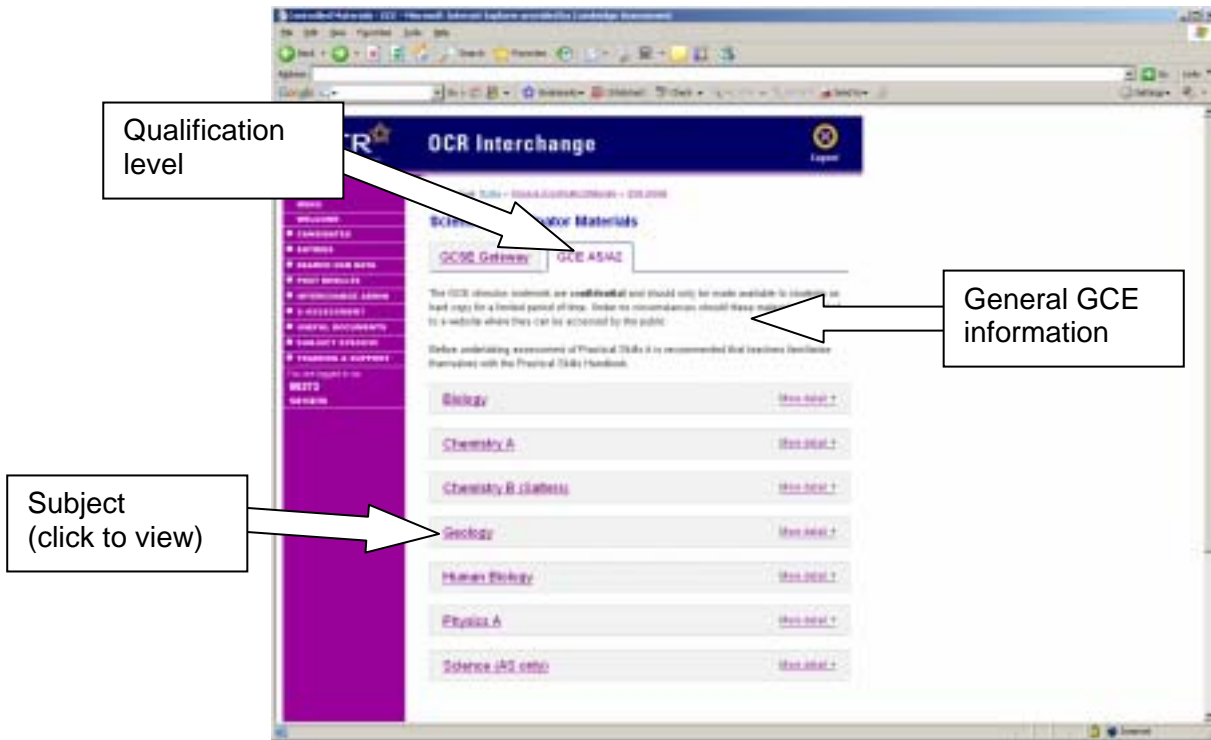
The teacher who has downloaded these materials is responsible for ensuring that they are stored securely so that students do not have the opportunity to access them. A record should be kept of the dates on which materials are downloaded.

Distribution of the Practical Tasks is limited to those students who are currently undertaking that Task. Task sheets should be photocopied and issued to students at the start of the Task. They must be counted out and in; numbering the documents may help to keep track of them.

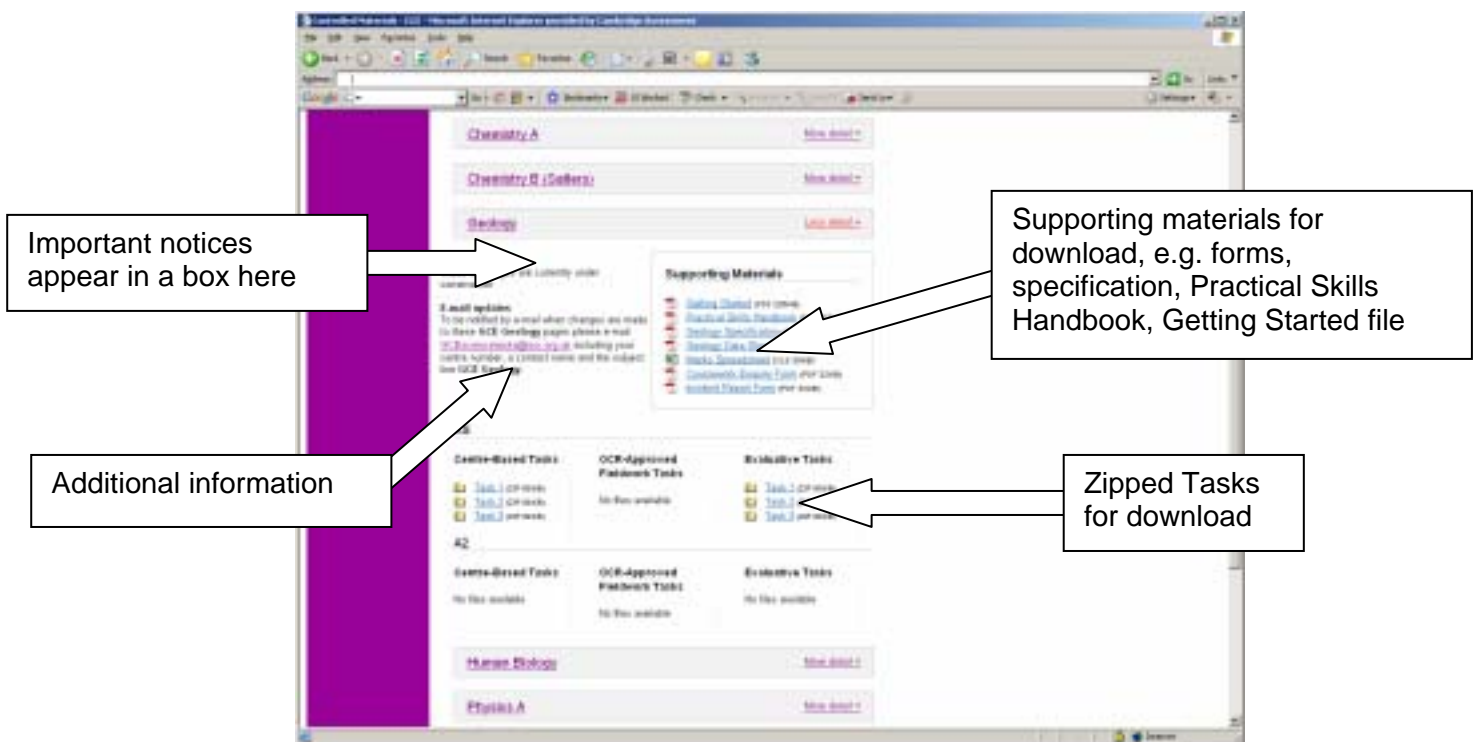
All unused Tasks and candidates' scripts must be collected after the assessment and stored securely or destroyed. Candidates must not take Tasks other than the field task out of the room where assessments are taking place.

Under no circumstances can candidates be allowed to see the marking schemes.

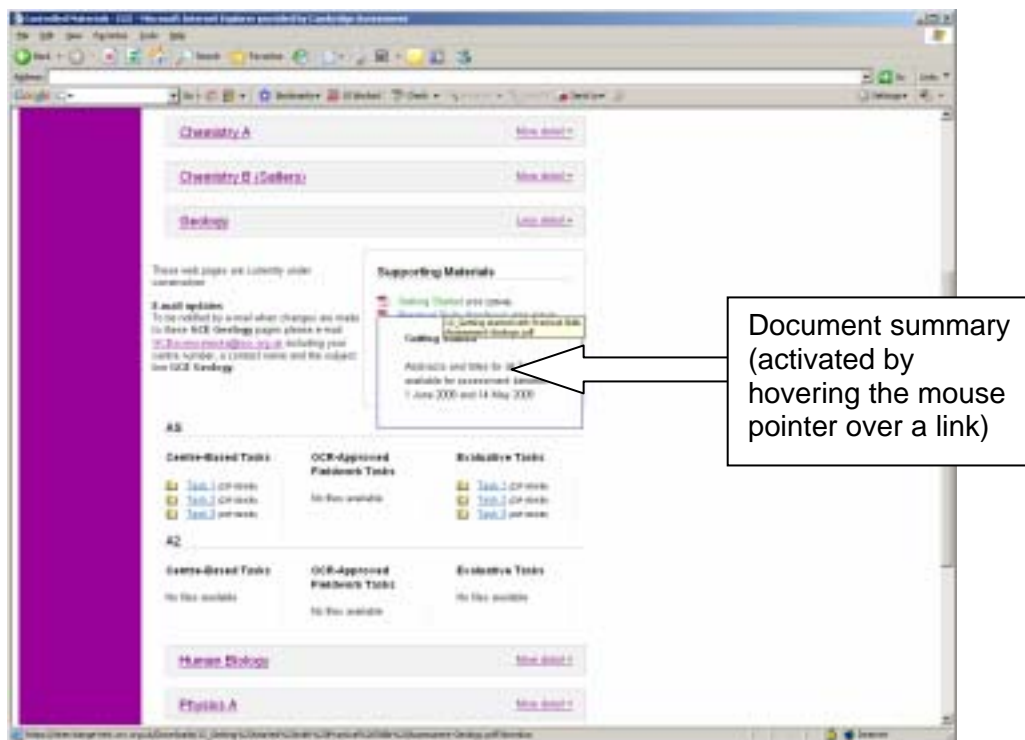
Science Materials pages are arranged according to qualification level and subject (see below).



The user simply clicks on the relevant link to access the relevant subject material. Any important notices are shown at the top of the page along with useful supporting materials (e.g. the specification, the Practical Skills Handbook, forms) and a 'Getting started' file (which includes an Abstract and title for each assessment task for the current assessment year). Tasks are arranged according to level and type (Qualitative, Quantitative and Evaluative, see below). Hovering the mouse pointer over a Task or document link generates a summary of the file.



Simply clicking on the Task link allows you to download the zipped material to your desktop. The zip file contains everything you need to complete the task (instructions, task and mark scheme). All files have a unique name so there is no danger of overwriting material on your computer.



E-mail updates

To be notified by e-mail when changes are made to the **GCE Geology** page on Interchange please e-mail GCESciencetasks@ocr.org.uk including your centre number, a contact name and the subject line **GCE Geology**.

Registering for Interchange

If your Examinations Officer is not already a registered user of Interchange then he/she will need to register before the Geology Tasks can be downloaded.

This is a straightforward process:

- Go to the website – <https://interchange.ocr.org.uk>;
- The first page has a New User section;
- Click on Sign Up to access the OCR Interchange Agreement Form 1;
- Download this document and fill in your details;
- Return form by post to OCR Customer Contact Centre, Westwood Way, Coventry, CV4 8JQ or fax the form back to 024 76 851633;
- OCR will then contact the Head of Centre with the details needed for the Examinations Officer to access OCR Interchange.

Administration and regulations

Availability of Tasks

Mark schemes, Tasks and Instructions will be available until **15 May** in each year. Tasks for the following year will be available from early June.

It is intended that Tasks should form part of the normal teaching programme and so may be taken by students at any time during the year. Where possible, it is a good idea to carry out a Task immediately after the knowledge, understanding and skills required for the Task have been taught.

Level	Unit & Task	First Tasks on Interchange by	Coursework submission date
AS	F793 Centre-based Task (x3) Evaluative Task (x3)	June 2008	15 May each year from 2009
A2	F796 Centre-based Task (x3) Evaluative Task (x3)	June 2009	15 May each year from 2010

Security

It is the responsibility of the centre to ensure that downloaded Tasks, mark schemes, instructions (including any copies made of these documents), and candidates' scripts are stored securely. Any breach in security should be reported to OCR as soon as possible by submitting a written report from the Head of Centre to the Subject Officer detailing the circumstances, the students concerned and any action taken. A blank report form is available on Interchange.

The instructions for each assessed Task contain information to allow teachers to check the availability of the necessary equipment and materials.

Tasks, Mark Schemes and Instructions can be downloaded at any time as long as they are kept secure. No information must be given either directly or indirectly to students relating to the content of the Tasks or the marking.

Centres should keep a record of the dates on which Tasks are downloaded and the dates on which the assessments took place.

Candidates' scripts for all completed Tasks must be stored securely and they should be available for moderation. It is suggested that they are destroyed after the last date for result enquiries following the examination series in which entries for the units concerned are made.

How to use the Tasks

There are at least three Tasks available of each type: Centre-based and Evaluative. These may be used in a variety of ways. For example, students may complete all three of the Centre-based Tasks and the teacher can then submit the best mark. Alternatively, the teacher may use the first Task for formative assessment, the second for submission of marks and keep the third in reserve in case a particular student does not perform well on the second Task.

A student is not permitted to have more than one attempt at a single Task, or to re-write or change a Task once it has been submitted to the teacher for marking.

Centre-Based Task

The practical activities used in the Tasks have been trialled. The Instructions provided should ensure that the students are able to collect appropriate data in the time available. However, it is vital that the teacher trials the Tasks before they are attempted by the students to ensure that:

- appropriate materials and equipment are available;
- the activity works and generates the expected data.

On some occasions it may be necessary for the teacher to carry out the task in order to provide a data set against which students' results can be marked.

Teachers may make appropriate changes to the materials and apparatus listed in the Instructions where these make provision easier/cheaper and they have no impact on the outcome of the activity. Other changes can be made to, for example, volumes, concentrations and amounts in order to make the experiment work as intended and to ensure that students are able to make appropriate observations and/or measurements. **All such changes may be made without OCR's approval**, but details must be retained and made available to the Moderator when work is submitted.

Details of changes made must be notified to OCR by e-mail to GCESciencetasks@ocr.org.uk
Please remember to include the centre number on all e-mails.

Field-Based Task

Each field activity will be written by an individual teacher to fit their field locality so will need to be trialled by each centre. Changes may be made to an activity after it has been approved if they have no impact on the outcome of the activity. Changes can be made to, for example, the exact locality within an area if dependent on tide or weather conditions in order to collect data as intended and to ensure that students are able to make appropriate observations and/or measurements. **All such changes may be made without OCR's approval**, but details must be retained and made available to the Moderator when work is submitted.

Details of changes made must be notified to OCR by e-mail to GCESciencetasks@ocr.org.uk
Please remember to include the centre number on all e-mails.

We will acknowledge all e-mails but will only respond in detail where there are concerns over suggested modifications. Remember to include the centre number on all e-mails. OCR will update the materials on the Interchange website where this is appropriate. If there are any issues with any of the experiments **that cannot be satisfactorily resolved by the centre**, details should be provided to OCR using the same e-mail address.

Centres with more than one teaching group

It is recognised that some centres are likely to have more than one group with lessons timetabled at different times. In these circumstances, centres are asked to ensure that a particular Task is carried out by all the groups in as short a period as possible.

Absence at the time of an assessment

If a student is absent from a centre when an assessment is carried out, the Task may be set at an alternative time provided that the centre is satisfied that security has been maintained by keeping all materials secure.

Candidates with access arrangements

Candidates who are eligible for access requirements and need additional time for the Evaluative Task may be given up to 25% extra time and their name should be recorded on the Interchange Access Arrangements site without further reference to OCR. Where other access arrangements are required, application should be made to OCR at the beginning of the course using the standard forms and procedures in the Joint Council regulations and guidance document. It should be remembered, however, that these Tasks are intended to assess practical skills. Credit is given to those skills which the candidate has performed independently. The Disability Discrimination Act lays no duty on awarding bodies to make adjustments with respect to the application of a competence standard, or, in this case, the assessment objective being tested.

Unexpected circumstances

If an unexpected problem (such as a fire alarm or other circumstance beyond the teacher's control) occurs while an assessed practical Task is taking place, the Task may be resumed subsequently provided the teacher ensures that no student is likely to have been advantaged or disadvantaged by so doing.

Support allowed for students

All practical Tasks will be accompanied by appropriate instructions. Teachers may provide additional safety instructions (including written advice) if this is felt to be necessary.

Students will not be permitted to refer to their class notes or to books during the Task except where specifically indicated on the Task cover sheet and Instructions.

If it becomes necessary for a teacher to provide a candidate with assistance during the course of a practical Task, the work may still be marked alongside the work of other candidates but the Task sheet must be annotated to indicate the assistance given. The teacher should use their professional judgement to award marks appropriately.

Supervision

All Tasks must be carried out under the direct supervision of the teacher. However, they are not practical examinations and there is no requirement for 'examination conditions' to be imposed. Students may need to interact as they collect materials or use particular pieces of equipment, but the teacher should set up the Tasks so that this interaction is kept to a minimum. The teacher must ensure that students do not copy from, or assist each other so that s/he can authenticate the work of each student with confidence.

Authentication

It is the responsibility of the centre to ensure that the work submitted for assessment is that of the candidate involved.

Group work

Students must work individually to collect their own data. However, where a Task requires the collection of a large data set, instructions may include the pooling of data from a number of students and each student will then work with the same large data set. It will always be expected that each candidate contributes his/her data to the pool. In some cases students may need to share equipment or apparatus and the centre must make arrangements for this to take place without disadvantaging any candidates.

Time allowed for Tasks

Centre-based Tasks are not time restricted: most have been designed to be conducted in a single practical session lasting about an hour.

Some Centre-based Tasks may require the use of two practical sessions. Where this is the case, the Task may be divided to allow a convenient point at which the experiment can be set aside for completion in the second session. In such cases the student Task sheets may be provided in two sections.

It is envisaged that **Fieldwork Tasks** devised by centres should be completed within half a day.

Evaluative Tasks should be completed within 1 hour.

There may, however, be a number of circumstances in which it is not possible to complete the work in the time available; for example, there may be a shortage of equipment, difficulties with the experiment, or a fire alarm. In such cases, students' work should be collected in and issued to them again at the start of the next lesson. They must **not** take the work away with them or complete it without supervision.

Repeating tasks

Candidates can only attempt a Task once. If, however, they score poorly on a Task, they may take another Task from within that Task-type.

Submission date for work

Candidates' marks must be despatched to the Moderator and to OCR to arrive by 15 May in the year of the examination.

The following forms (available from Interchange and www.ocr.org.uk) must be included with the submitted marks:

- Centre authentication sheet (CCS160);
- Details of any changes made to the experiments. Changes can be marked up on a blank copy of the Task or Instruction Sheet).

The Moderator will ask for a sample of work. If there are ten or fewer candidates at the centre, all work submitted should be sent to the Moderator to arrive by 15 May.

Internal standardisation

A centre must set up an internal standardisation procedure to ensure that all teachers at the centre are applying the mark schemes in the same way. This procedure could include double marking of a sample of candidates, or the remarking of work by an experienced senior member of staff.

Coursework consultancy

OCR offers a coursework consultancy service whereby centres can send up to four photocopies of marked work to OCR for commentary by a senior Moderator. If a centre wishes to make use of this service, work should be submitted to OCR no less than 8 weeks before the coursework submission date (15 May). The coursework enquiry forms are available at www.ocr.org.uk and on Interchange.

Marking advice for teachers

The marking schemes provided to centres have been made as explicit and as easy to apply as possible. Teachers should note that the mark schemes are not hierarchical; i.e. the awarding of marks is not dependent on the candidate gaining marks for earlier parts of the task. A measure of professional judgement may sometimes be necessary.

Once the work has been collected in, it must be marked by the teacher as it stands. **Under no circumstances can a candidate be allowed to change or elaborate on an answer.**

Teachers are reminded that it is possible for a student to be assessed on another occasion using a different Task and that the best mark achieved for each Task-type should be submitted. It is appropriate for the teacher to provide feedback to explain how the work could have been improved although details of the mark scheme must not be directly communicated to the student.

Tasks should be marked clearly, in red ink, and in accordance with the Task-specific mark scheme. Annotation can help the Moderator and staff in the centre who are checking the marking as part of internal standardisation.

Useful annotations consist of:

- ticks and crosses against responses to show where marks have been earned or not earned;
- specific words or phrases to confirm why a mark has been earned or indicate why a mark has not been earned (e.g. indicate an omission).

Where a candidate has given an answer not covered by the mark scheme, the teacher should use his/her professional judgement to decide whether the answer is worthy of credit. If it is, then the script should be annotated accordingly and the mark(s) awarded.

3 General requirements for AS and A2 practical work

Suggested practical activities have been included within the specification at the end of each module. Whilst carrying out these experiments is not a requirement, their purpose is to ensure that the skills required for assessment will have been covered. Alternative experiments may be chosen but centres should be careful to consider whether sufficient experience will have been provided for students prior to the use of the assessed Tasks.

Skill development

There are generic skills which should be developed during the study of AS and A2 Geology. The sophistication required of candidates should increase throughout the course, partly as their practical experience grows but also through the extra demands expected by more complex experiments and observational techniques.

General

At both levels, the course aims to provide candidates with the opportunity to:

- develop good laboratory / field techniques;
- make and record accurate measurements and observations;
- interpret the results of experiments;
- establish whether data collected from experiments / fieldwork is valid and reliable;
- evaluate experimental / field technique and scientific method in the light of practical experience;
- gain a knowledge of laboratory / field safety.

In their teaching, teachers should focus on the key areas above whilst developing the candidates' skills through a coherent practical programme.

In carrying out practical / field Tasks, candidates should acquire the necessary experience to be able to carry out the Centre-based / Field-based and Evaluative Tasks that will be tested by the assessed Tasks.

Centre-based Tasks

Candidates should be able to:

- identify any hazards in the chemicals to be used or made, noting down appropriate control measures (e.g., eye protection, protective gloves, extinguishing naked flames);
- handle harmful materials safely
- use appropriate techniques, reagents and apparatus to complete suitable activities;
- manipulate standard laboratory apparatus safely and with confidence to produce accurate data;

- record all suitable observations and data in an appropriate format and to an appropriate degree of accuracy, taking into consideration the apparatus used;
- make and record measurements reliably and accurately;
- use and record the correct units for all measurements taken;
- perform calculations based on their practical work
- construct and interpret appropriate graphs from data collected or provided;
- reach a valid conclusion based on the observations made or data collected.

Evaluative Tasks

Candidates should be able to:

- recognise anomalous results on the basis of measurements provided;
- identify the limitations of accuracy in experimental / field procedures;
- recognise that some errors may be inherent in the equipment used;
- construct and interpret appropriate graphs from data collected or provided;
- reach a valid conclusion based upon the data provided.
- evaluate both the procedural and measurement errors associated with a particular task and comment on the most significant errors;
- suggest sensible improvements to experimental procedures and the taking of measurements based on their laboratory experience.

4 Practical work for AS Unit F793

This section provides a summary of the practical experience and skills that will be acquired by the use of the activities suggested in the modules or by the use of equivalent Tasks devised by the centre.

F793 Global Tectonics

(a)

- Use scale models or graphs of planets in the solar system to illustrate the difference in size between the two groups of planets.
- Use models to show the of different relative depth of Earth layers
- Use a light source and beaker of water to illustrate refraction of seismic waves by the liquid outer core to form shadow zones.
- Partial melting can be illustrated by the melting of chocolate in some chocolate chip cookies.
- DIY “potty putty” made from sodium tetraborate (borax) and PVA glue as an analogue for the plastic asthenosphere.
- Use a bar magnet, iron filings and plotting compasses as an analogy of the Earth’s magnetic field.

(b)

- Use Slinkies™ to demonstrate P, S and L wave motion.
- Plot data to calculate earthquake isoseismals and earthquake epicentres.
- Simulate liquefaction by vibrating sand.
- Carry out research on the effects of individual earthquakes.
- Simulate base isolation systems.
- Use web based software such as ‘*Virtual Earthquake*’ to calculate magnitude and epicentre.

(c)

- Devise and plan an activity to produce convection cells using water, a heat source and potassium permanganate. Observe and record rates of convection.
- Plot the distribution of earthquakes to demonstrate plate margins.
- Research specific plate boundaries to identify the type of plate margin.
- Use computer simulations or paper models to reconstruct the continents before continental drift occurred..

(d)

- Use modelling clay and dough to make models of stress and strain, dipping beds, joints and folds.
- Use photos, sketches and maps to interpret folds and faults.
- Illustrate cleavage using match sticks or spaghetti with compressive stress applied to show the rotation of particles at right angles to the maximum stress
- Plot rose diagrams to illustrate joint patterns.

F792 Rocks – Processes and Products

(a)

- Use strips of paper / till rolls to appreciate the extent of geological time.
- Use flow charts and hand specimens to distinguish broad classes of rocks.

- Use hand specimens and photographs to aid identification of igneous sedimentary and metamorphic rocks

(b)

- Investigate crystal size and rate of cooling using salol and microscope slides at different temperatures.
- Use a lava lamp to simulate rising magma.
- Simulate lava flows of different viscosities using jelly, sand and water mixtures, treacle or wallpaper paste.
- Simulate partial melting using chocolate chip cookies.
- Use liquids of different densities to show differentiation.
- Use hand specimens and photographs for recognition of rock types and texture.

(c)

- Carry out weathering experiments using nails and test tubes (oxidation), and wetting and freezing rock samples (frost shattering).
- Use a tennis ball to demonstrate traction, saltation and suspension.
- Use a fish tank and sediment to produce turbidity currents.
- Investigate changes in grain shape using rock fragments or sugar cubes shaken in a tube.
- Make graded bedding in a jar containing water and poorly sorted sediment mixture.
- Make cross bedding using sand and sugar.
- Make desiccation cracks by evaporation of clay slurry.
- Carry out grain size analysis of sands by sieving.
- Make asymmetrical ripples in a circular tank of sand and water and symmetrical ripples in a rectangular tank.
- Use hand specimens and photographs for recognition of rock types, textures and sedimentary structures.

(d)

- Use dry spaghetti and rulers to demonstrate alignment of crystals in relation to stress.
- Measure and record temperatures of sand around a buried container of hot water to model the size of a metamorphic aureole.
- Use hand specimens and photographs for recognition of rock types and texture.

5 Practical work for A2 Unit F796

This section provides a summary of the practical experience and skills that will be acquired by the use of the experiments suggested in the modules or by the use of equivalent Tasks devised by the centre.

It should be noted that the practical experience acquired at AS may be tested at A2.

F794 Environmental geology

(a)

- Carry out porosity experiments – finding the porosity of rocks by finding their dry and wet mass; use marbles in a beaker to model porosity.
- Carry out permeability experiments – attaching tubes to rocks with silicone sealant and timing rate of flow of water into rocks; using sediment with different degrees of sorting in filter paper to model permeability.
- Model hydrostatic pressure and hydraulic head – use a large plastic tube or measuring cylinder with holes drilled up one side, fill with water and measure how far jets of water come out.
- Model a confined aquifer and artesian conditions – use a U tube with bung at one end filled with water; when bung is removed the water level on that side will rise up.

(b)

- Model oil in a trap using a beaker of water with coloured cooking oil on top and tilting beaker to show layer of oil is always horizontal.
- Model an oil trap and gusher – use an inverted funnel with bung in the end held by a clamp in a beaker full of water: Add oil by squirting under water with pipette and add gas by introducing methane or blowing air under water: Remove bung and see what happens. Note that this requires use of safety glasses.
- Carry out a computer simulation of oil and natural gas exploration programme.
- Study hand specimens of types of coal to show the physical properties of lignite, bituminous coal and anthracite.

(c)

- Study hand specimens of ore minerals to indicate suitable properties for gravity-settling (magnetite) or placer deposition (cassiterite). Find the density of ore minerals.
- Investigate gravity-settling using minerals of different densities and a measuring cylinder filled with liquid wallpaper paste.
- Plot and interpret rose diagrams of mineral vein information.
- Carry out a computer simulation of a metals exploration programme.

(d)

- Test rocks for roadstone – experiments to find hardness, impact strength, porosity/permeability, resistance to abrasion, resistance to freeze-thaw action, resistance to chemical corrosion.

F795 Evolution of Life, Earth and Climate

(a)

- Use the internet to research the different types of exceptional preservation.
- Use sea shells and plaster of Paris to make internal and external moulds. Refill the plaster of Paris moulds with another substance (eg. jelly or plasticine) to make a cast.

- Use a tray filled with wet sand and move objects across the surface and study their impressions. Notice the difference in shapes when the objects are moving at different speeds, or at rest. Add more water and finer sand to compare the effect of softer substrates. Use a digital camera to record data for analysis.
- Study assemblages of fossils to investigate palaeoenvironments.

(b)

- Use the internet to research the different types of fossil group (e.g. morphology, mode of life, evolution etc.)
- Use modern shells and masses directed at a fixed point to assess relative damage to shells of different thicknesses or with different types of ornament. Relative strength can be determined using quantitative methods.
- Study and draw real fossils in the laboratory.
- Make model bivalves and brachiopods to explain how they opened and closed their valves.
- Make rose diagrams of fossil orientation.

(c)

- Use the internet to research the different types of fossil group (e.g. dinosaurs and evolution, etc).
- Carry out an investigation to compare the relative strengths of differently folded paper or thin card. Apply masses and measure distortion. This simulates the types of sutures in cephalopods.

(d)

- Use the internet to research the main extinction events.
- Use geological maps, photographs and cross sections to write a geological history.

(e)

- Use the internet to research the main changes in climate events. Analyse data to investigate changes throughout geological time.

6 Apparatus list for Units F793 and F796

Access to basic laboratory equipment will usually be required, but the tasks available will use different equipment so that a centre should not be at a disadvantage

Unit F793

For each student, the following apparatus *may* be required to complete the assessed Tasks:

- Sieve stacks with a minimum of 6 ideally ranging from phi 2 to phi -4. Variations from this range will be possible as teachers will be marking for the sieve sets used.
- Sand samples. The exact type will not be specified as teachers will trial the experiment and mark on the basis of the sample used.
- Samples of common rock types
- Hand lens
- Grain size card
- Compass/clinometer
- Tape measure
- Microscope slides
- Microscopes
- Filter funnels and filter papers
- Measuring cylinders
- Thermometer (−10 to +110 °C)
- Stop clocks/watches reading to 1 s or better.
- Pipeclay triangle
- Test-tubes and boiling tubes
- Test-tube holders
- Dropping pipettes
- Bunsen burner
- electronic balance to 1 dp

Unit F796

In addition to the apparatus indicated in Unit F793 above, the following may also be required.

- Displacement cans
- Mineral specimens of different density

Alternative apparatus for candidates eligible for access arrangements

Advice about specialist equipment that may be suitable for candidates eligible for access arrangements (e.g. talking thermometers, talking scales, etc.) can be obtained from the RNIB (www.rnib.org.uk) and other specialist disability organisations. Before using such equipment for an assessed task, OCR should be contacted to ensure that its use does not interfere with the competence standards being assessed.

7 Resources

General resources

OCR Geology: Frances Stratton Ed. Debbie Armstrong, Malcolm Fry, Frank Mugglestone and Ruth Richards, published by Heinemann, May 2008 is written by members of the senior examiner team.

The OCR website – www.ocr.org.uk – has;

- Examples of: Centre-based Tasks, alternative Fieldwork Tasks, Evaluative Tasks
- a Scheme of Work
- some suggested lesson plans.

INSET

OCR runs INSET courses every year, primarily in the autumn term, and these include sessions partly to support internally assessed Tasks. More details about INSET provision are available at www.ocr.org.uk

Coursework consultancy

OCR offers a coursework consultancy service whereby centres can send photocopies of up to four pieces of marked Tasks to OCR for commentary by a senior moderator. If a centre wishes to make use of this service, work should be submitted to OCR no less than 8 weeks before the coursework submission date of 15 May i.e. before 20 March.

Forms to request this service are available at www.ocr.org.uk and on Interchange.

8 Health & Safety

A code for geological fieldwork

This code is based on the Geologists Association Guidelines first published in 1975. Geologists must be seen to be using the countryside responsibly and observing the following rules:

General

1. Obey the Country Code and local bylaws.
2. Shut all gates and leave no litter.
3. Don't litter fields or roads with rock fragments that could cause injury to livestock or be a hazard to vehicles or pedestrians.
4. Always seek permission before entering private land.
5. Do not disturb wildlife or plant life.
6. On coastal sections, check tides or local hazards such as unstable cliffs.
7. Observe any rules which may apply such as SSSI status.
8. Avoid using a hammer.

Collecting

1. Only collect when it is permissible to do so.
2. Do not leave exposures untidy or dangerous.
3. Students should be encouraged to observe and record and not to hammer indiscriminately. Keep collecting to a minimum.
4. Avoid removing in-situ fossils, rocks or minerals unless they are genuinely needed for serious study. The collecting of actual specimens should be restricted to those localities where there is a plentiful supply, or scree, fallen blocks and waste tips.
5. Never collect from walls or buildings.

Safety

1. Always wear a hard hat when working under any cliff face or in any quarry etc.
2. Always wear goggles when hammering.
3. Boots or other suitable footwear should be worn when the Leader requires them.
4. Keep clear of plant or machinery.
5. Beware of rock falls.
6. Beware of sludge lagoons or settling ponds in quarries etc.
7. Do not dislodge rocks or throw things over cliffs etc - someone may be below.

8. Keep a look out for dangers not only to yourself but for all members of your party.
9. If you go onto the fells, moors or mountains, let someone know your route and return time.
10. Always carry a first aid kit.
11. Never go onto the fells, moors or mountains without suitable clothing and equipment.
12. DO NOT ENTER a working quarry etc without permission.
13. Do not take risks on cliffs or rock faces.

The Health and Safety at Work Act requires that safety measures are strictly enforced, especially in quarries or other excavations. Protective clothing, particularly safety helmets, must be worn at all times by employees, and visitors are also expected to observe the same precautions, generally as a condition of entry to the site. In quarries, helmets must be worn at all times.

Suitable helmets are readily available and cheap to buy, and they should be part of the standard equipment of every geologist and worn wherever there is a danger of rock falls.

Leaders of a field party should ensure that the spirit of this code is followed, and remind students of the need for care and consideration at all times.

In UK law, health and safety is the responsibility of the employer. For most establishments entering candidates for AS and Advanced GCE this is likely to be the education authority or the governing body. Employees, i.e. teachers and lecturers, have a duty to cooperate with their employer on health and safety matters. Various regulations, but especially the COSHH Regulations 2002 and the Management of Health and Safety at Work Regulations 1999, require that before any activity involving a hazardous procedure or harmful micro-organisms is carried out, or hazardous chemicals are used or made, the employer must provide a risk assessment. A useful summary of the requirements for risk assessment in school or college science can be found at www.ase.org.uk/html/teacher_zone/safety_in_science_education.php. For members, the CLEAPSS[®] guide, *Managing Risk Assessment in Science** offers detailed advice. Most education employers have adopted a range of nationally available publications as the basis for their Model Risk Assessments. Those commonly used include:

- Safety in Science Education, DfEE, 1996, HMSO, ISBN 0 11 270915 X;
- Now out of print but sections are available at www.ase.org.uk/html/teacher_zone/safety_in_science_education.php
- Safeguards in the School Laboratory, 11th edition, 2006, ASE ISBN 978 0 86357 408 5;
- CLEAPSS[®] Hazcards, 2007 edition and later updates*
- CLEAPSS[®] Laboratory Handbook, *
- Topics in Safety, 3rd edition, 2001, ASE ISBN 0 86357 316 9;
- *Hazardous Chemicals*, A Manual for Science Education, 1997, SSERC Limited
ISBN 0 9531776 0 2 (see www.sserc.org.uk/public/hazcd/whats_new.htm)

Where an employer has adopted these or other publications as the basis of their model risk assessments, an individual school or college then has to review them, to see if there is a need

to modify or adapt them in some way to suit the particular conditions of the establishment. The significant findings of such risk assessment should then be recorded, for example on schemes of work, published teachers guides, work sheets, etc. There is no specific legal requirement that detailed risk assessment forms should be completed, although a few employers require this.

9 FAQs

When are Tasks available?

At AS, for the June 2009 session: Tasks, Instructions and Mark Schemes will be available from early June **until 15 May**. For future sessions (June 2010 onwards) Tasks and Instructions will be available from early June **until 15 May**; Mark Schemes will be available by 1 September **until 15 May**.

At A2, for the June 2010 session: Tasks, Instructions and Mark Schemes will be available from early June **until 15 May**. For future sessions (June 2011 onwards) Tasks and Instructions will be available from early June **until 15 May**; Mark Schemes will be available by 1 September **until 15 May**.

Can I do the course in a linear way?

Yes. But the practical tasks must be taken by candidates in the period for which they are valid. For instance a school could undertake an AS Centre-based task in the period 1 June 2008 to 14 May 2009 and an AS Evaluative Task in the period 1 June 2009 to 14 May 2010 and submit for AS aggregation in the June 2010 session.

How many Tasks does a student have to complete?

Just one Centre-based or Field-based task **and** one Evaluative Task at AS and the same for A2. If more than one of a Task type is undertaken, the best mark should be submitted to OCR.

Can I modify the Task due to equipment shortages at my school?

Yes - for Centre-based Tasks.. Provided that the nature of the experiment and the results obtained by students are not affected. Details of such changes **must** be provided to the Moderator. Details of changes made must be notified to OCR by e-mail to **GCEscientetasks@ocr.org.uk**

OCR will acknowledge all e-mails but will only respond in detail (within 4 weeks of acknowledgement of receipt from OCR) where there are concerns about suggested modifications. Remember to include the centre number on all e-mails. OCR will update the materials on the Interchange website where this is appropriate. If there are issues with any of the tasks **that cannot satisfactorily be resolved by the centre**, details should be provided to OCR using the same e-mail address (**GCEscientetasks@ocr.org.uk**).

Centres should retain copies of any correspondence with OCR and forward copies to the moderator with the sample of candidate work.

No - for Evaluative Tasks. Tasks must be given to students exactly as supplied from OCR.

Can I devise my own Tasks?

Yes for the fieldwork task **only** as an alternative to the OCR-set Centre-Based Task.

Only the Evaluative Tasks available on Interchange can be used for assessment purposes in that year. If you have a suggestion for a new Task please contact the Subject Officer.

Can some students submit the centre-devised Fieldwork Task and other students from the same centre submit the OCR-set Centre-based Task?

Yes

Is there a time limit for students completing a Task?

Centre-based / Field-based Tasks are not time restricted. Most have been designed to be conducted in a single practical session lasting about an hour. However, the fieldwork task is likely to take longer but *should not exceed a half day*. There may be a number of circumstances in which it is not possible to complete the work in the time available; for example, there may be difficulties with weather conditions, a fire alarm or shortage of equipment. In such cases, students' work should be collected in and issued to them again at the start of the next lesson or time slot. They must **not** take the work away with them or complete it without supervision.

Evaluation Tasks should be completed within 1 hour.

Students with special requirements requiring additional time may be given up to 25% extra time without consulting OCR. Their name should be recorded on the Interchange Access Arrangements site. Where other access arrangements are required, application should be made to OCR at the beginning of the course.

Can students take Tasks home to complete?

No. The Tasks have to be completed in lesson time under controlled conditions, under the direct supervision of the teacher.

The exception to this is the field-based task where field notes may be rewritten if better clarity is required. The original notes should be submitted as well as the copy.

What can students bring into class to help them do a Task?

In most cases no additional materials will be permitted. If they are, then the front page of the Task will always indicate this.

There are colour images in some tasks. Do I have to provide every candidate with their own copy?

NO. It is fine to project the downloaded pdf colour page onto a white board and give each candidate a black and white copy of the task.

Can students word process their work and use ICT to draw graphs?

No. Students must write their answers and plot any graphs in the spaces provided on the Task sheet.

Can additional answer sheets be supplied to students?

Yes. Any additional answer sheets used by students should be stapled securely to the completed Task sheet. This will be particularly likely for field-based exercises and water proof paper and answers in pencil will be acceptable.

Can students do research in lesson time and if so can they be given suitable stimulus material by the teacher?

No. All the assessment material required for the Task is available from Interchange.

What should I do if there is evidence of students producing identical work?

The teacher is required to authenticate the work and the marks awarded for each student. Where the teacher is not prepared to authenticate the work, marks should not be submitted. Students are required to work independently even in the field, but they should remain close to other students within a single locality both for supervision and health and safety reasons.

Are students able to copy sections straight from a book or a website?

This will very rarely be appropriate and only where Tasks require the use of reference books or websites. The front page of the Task will always specify whether or not extra material, such as reference books, is required by students.

What happens if the activity does not work?

All Tasks should be trialled by the teacher before they are given to students to use towards their assessment. If the trialling shows a possible problem with the Task, the Geology Subject Officer should be contacted via e-mail at GCEscientetasks@ocr.org.uk as soon as possible. a response will be provided within two weeks of confirmation of receipt.

My students have attempted a Task but they didn't do very well. What can I do?

Students will not do well unless they are taught the skills needed. Give the students some feedback and then give them another Task to do at an appropriate point in the course. Make sure they understand what is required for the Task type.

Can students draft and redraft Tasks?

No. Students must submit their original piece of work. If this is unsatisfactory for any reason, the student should attempt another Task. This includes field-based work in terms of redrafting and work can be marked even if it is slightly muddy. However there are circumstances where extreme weather conditions may mean that rewriting field notes is essential. The original notes should be submitted as well as the copy.

Can students repeat a Task?

No. Tasks must be attempted by students only once. If a student wishes to improve their performance they may take another Task within that Task type, e.g. Centre-based Tasks. The teacher may give formative feedback on the completed Task. If a field-based task has been carried out then a centre-based task can be completed as an alternative and the highest mark submitted.

Can I resubmit a Task on a subsequent occasion?

Yes. The marks confirmed by the moderator when the task was first submitted cannot be 'carried forward'. Teachers will be able to remark the Task in the light of any comments made by the original moderator and it will be re-moderated when it is resubmitted.

Can I use a Task for skill development/formative assessment?

Yes. Teachers should note however, that there are limited numbers of Tasks available for assessment and that the same security procedures must be followed as if it was an assessed Task intended for submission to OCR. The Practical Skills handbook identifies the skills required, so you could amend current in-house practicals to train your students in the skills they need. The Specimen Assessment materials are also available and provide a useful tool for preparing students for Practical Skills assessment.

Can I tell students their mark for the Task?

Yes - but the marked Task **must not** be given back to or shown to the student. The students must also be told that this is a provisional mark, subject to moderation.

Can I show the mark scheme to my students?

No.

What feedback can I give to a student?

Formative feedback is important. Feedback specific to the completed Task **must not** be given. General feedback on how the student could improve at that particular Task type can be given. Students **must not** be given the opportunity to add to or improve the work.

Can I award half marks?

No. Only whole marks should be awarded for responses that match the specific mark scheme for the Task. If in your professional judgement you are unsure that a response is creditworthy you should not award the mark.

Can I get guidance on my marking?

Yes.

OCR offers a coursework consultancy service and also runs regular INSET events where internal assessment will feature strongly.

Will the marking of the Task be moderated?

Yes.

OCR will appoint a Moderator to sample candidates' work from every centre.