SCOTTISH QUALIFICATIONS AUTHORITY

GEOLOGY
Intermediate 1

Third edition – published November 1999

SCOTTISH QUALIFICATIONS AUTHORITY

NOTE OF CHANGES TO ARRANGEMENTS
THIRD EDITION PUBLISHED ON CD-ROM NOVEMBER 1999

COURSE TITLE: Geology (Intermediate 1)

COURSE NUMBER: C043 10

National Course Specification

Course Details: Core skills statements expanded

National Unit Specification:

All Units: Core skills statements expanded

SCOTTISH QUALIFICATIONS AUTHORITY

National Course Specification

GEOLOGY (INTERMEDIATE 1)

COURSE NUMBER C043 10

COURSE STRUCTURE

This course has three mandatory units as follows:

D243 10	***The Study of the Earth***	***1 credit (40 hours)***
D244 10	***Geology and Scenery***	***1 credit (40 hours)***
D245 10	***Geology, People and Environment***	***1 credit (40 hours)***

In common with all courses, this courses includes 40 hours over and above the 120 hours for the component units. This is for induction, extending the range of learning and teaching approaches, support, consolidation, integration of learning and preparation for external assessment. This time is an important element of the course and advice on its use is included in the course details.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

Administrative Information

Publication date: November 1999

Source: Scottish Qualifications Authority

Version: 03

National Course Specification (cont)

COURSE Geology (Intermediate 1)

CORE SKILLS

This course gives automatic certification of the following:

Complete core skills for the course	None	
Core skills components for the course	Critical Thinking	Int 1
	Using Graphical Information	Int 1

For information about the automatic certification of core skills for any individual unit in this course, please refer to the general information section at the beginning of the unit.

Additional information about core skills is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

National Course Specification: course details

COURSE Geology (Intermediate 1)

RATIONALE

Geology provides a very wide area of study. It frequently draws on aspects of geography, chemistry, physics and biology. Thus, Intermediate 1 Geology provides a vehicle for extending and integrating knowledge, understanding, skills and attitudes already developed in scientific and geographic aspects of 5–14 Environmental Studies.

- Candidates will be introduced to a variety of topics, such as the structure of the Earth; minerals and rocks; fossils and Earth history; surface shaping processes; and the effects of changing sea level
- Candidates will see how Earth movements produce folds and faults. They will come to understand how scenery is affected by the underlying rock structure
- Through a consideration of the formation and extraction of fossil fuels, ores and construction materials, candidates will readily appreciate the economic significance of geological studies
- The study of areas of concern – such as the use of finite and non-renewable resources; the contamination of water supplies; the disposal of nuclear waste; and the consequences of mining and quarrying – will foster positive attitudes towards our fragile environment
- The undertaking of practical work and field studies will develop skills of observation, measurement, interpretation, recording and communication
- Scotland has few equals as an area in which to study geology. Many significant contributions to geology have been made by Scots, and the mining of coal, oil shale and metals have all been major Scottish industries. Candidates will come to see that geology is a significant component of our natural, intellectual and industrial heritage

AIMS OF THE COURSE

The main aims of the course are to:

- provide candidates with a broad-based scientific education
- develop skills of observation, recording, communication and analysis
- foster positive attitudes towards caring for the use of Earth resources
- develop awareness of the natural environment and of the processes which have shaped it

COURSE CONTENT

The main topics covered by the units are as follows:

The Study of the Earth (40 hours)

The structure and history of the Earth. Minerals, rocks and fossils. Geological structures. The economic, social and environmental significance of geology.

Geology and Scenery (40 hours)

Physical and chemical weathering. Erosion and deposition by water, wind and ice. The influence of geological structure on scenery. The effects of changing sea levels on landscapes.

National Course Specification: course details (cont)

COURSE Geology (Intermediate 1)

Geology, People and Environment (40 hours)

The formation, discovery, extraction and use of ores, fossil fuels and construction materials. The water cycle, water supply, groundwater. The geological and environmental consequences of mining and quarrying. Geological considerations in civil engineering and in problems of waste disposal. The finite nature and careful use of geological resources.

External assessment will sample all of the content.

Information on the content of each unit is given in the following table:

THE STUDY OF THE EARTH

CONTENT	SUPPLEMENTARY NOTES
Structure and history of the Earth Crust, mantle, outer core, inner core.	Candidates should know that the crust consists of igneous, sedimentary and metamorphic rocks. The mantle consists of rock and the core consists of metal. The outer core is liquid, while the inner core is solid. Sources of evidence should be mentioned: eg, what earthquakes tell us; various types of meteorites; pieces of mantle come up in volcanoes.
Formation of the Solar System from nebula of dust and gas.	The age of the Earth should be mentioned.
How the Earth has changed through geological time.	*Major changes in the Earth*: accretion; melting; growth of continents; movements of continents; appearance and effects of lifeforms.
Changing conditions in the British area through geological time.	*Changes in the British area*: conditions were marine, desert, semi-arid, equatorial swamp and glacial at various times. There were also periods of mountain-building and volcanicity. Some of these changes can be related to the movements of continents.
Minerals and rocks *Minerals*: minerals defined as elements or compounds. The following minerals should be studied: quartz, feldspar, mica, calcite, pyroxene, haematite, galena, pyrite, malachite, talc. *Mineral properties*: colour, streak, hardness.	Audio visual material could be gainfully employed and museum visits may prove useful.

CONTENT	SUPPLEMENTARY NOTES
Rocks: the characteristics and modes of formation of igneous, sedimentary and metamorphic rocks, Classification of rocks. The following rocks should be studied: granite, basalt, dolerite, gabbro, sandstone, limestone, mudstone, conglomerate, slate, marble, schist, gneiss. *Rock properties*: colour, grain size, texture (fragmental, crystalline), internal structure (sedimentary layering, metamorphic banding or mineral alignment), presence of fossils.	Candidates should realise that rocks are made up of one or more minerals. Mention should be made of the criteria used to classify rocks: eg, mode of formation (igneous, sedimentary, metamorphic); mineral content (granite, gabbro); grain size (gabbro, basalt, sandstone, mudstone); type of foliation (slate, schist, gneiss). Simple experiments may be carried out to show how rocks form: eg, crystallisation of molten acetamide or Wood's metal to show how igneous rocks form; use of circular flume to show how sediment is deposited; squeezing of 'Plasticine' with embedded rice grains to show how preferred orientation develops in metamorphic rocks. Candidates should be able to identify the minerals and rocks listed. Keys and tables may be used as an aid to identification.
Fossils Fossils should be defined as the remains or traces of organisms found in rocks.	Candidates should realise that fossilisation is highly selective: most organisms are not fossilised; it often happens that only hard parts are fossilised. It should also be noted that the fossil may not consist of unaltered organic material (eg, plant fossils often consist entirely of carbon). Simple experiments may be used to show modes of preservation: eg, moulds and casts can readily be made.
Extinctions and evolutionary changes in organisms. Use of fossils in relative dating.	Candidates should realise that lifeforms have changed through geological time and that rocks of different ages contain different suites of fossils.
What fossils tell us about ancient environments: eg climatic conditions, habitats, conditions of deposition.	Some examples should be given: eg, echinoids indicate marine environments; coral reefs are indicative of warm, clear seas; thick coal seams suggest that forests grew in hot, wet climatic conditions; dinosaur fossils indicate warm, terrestrial conditions. Exercises could usefully be given: eg, matching organisms with their environments; dating rocks by means of their fossil contents.
The following fossils should be studied: a brachiopod, a bivalve, a gastropod, an ammonite, a belemnite, a coral, an echinoid, a trilobite, a graptolite, a plant, a vertebrate, a trace fossil.	Specimens or plaster casts of fossils should be studied. Candidates should be able to identify the fossils listed. Keys and tables may be used as an aid to identification.

CONTENT	SUPPLEMENTARY NOTES
Geological structures Strike and dip.	Candidates should be able to interpret the symbols for strike and dip.
Modes of formation of synclines, anticlines, faults and dykes; recognition of these structures on block models and maps.	Candidates should realise that folds are produced when compressed rocks bend. Faults are formed when rocks are broken and moved. Faults may be formed by pushing, pulling or sliding forces. Simple bending and breaking experiments may be done to show how folds and faults are formed. Dykes are wall-like igneous intrusions.
Relative dating of beds and structures by means of superposed and cross-cutting relationships.	Superposed and cross-cutting relationships should be studied by use of block models and maps. A maximum of three cross-cutting relationships should be shown.
Economic, social and environmental factors Classification of resources as physical and biological; renewable and non-renewable.	Candidates should realise that most of our physical resources come from the Earth. (It should be noted that fossil fuels are classified as physical resources). The problems of defining resources as renewable or non-renewable should be considered. Over what timescale should a renewable resource replenish itself? Would soil and peat be considered to be renewable or non-renewable?
Careful management of resources. Problems of overuse and misuse.	The overuse of renewable resources, such as non-volcanic geothermal energy and artesian water means that such resources effectively become non-renewable. Water resources may be misused by being polluted. Should natural gas be burned in power stations?
Conservation of the environment.	Reference should be made to the effects of deep mining (eg, subsidence, bings, pollution of surface water), opencast mining, quarrying, burning of fossil fuels (acid rain, enhanced greenhouse effect), oil spills, radioactive wastes. Mention should be made of procedures which can be carried out to reduce environmental damage: eg, site restoration when opencast mining has ceased; removing SO_2 from power station flue gases (though this does produce more CO_2). A visit to an opencast mine or quarry could usefully be undertaken.

GEOLOGY AND SCENERY

CONTENT	SUPPLEMENTARY NOTES
Physical and chemical weathering	This unit is ideally suited to the use of fieldwork. Every opportunity should be taken to study processes and landforms in the field.
Definition of physical weathering. Process of freeze-thaw action. Production of angular fragments and scree slopes.	Experiments can be done to show the effects of repeatedly freezing and thawing soaked shale.
Definition of chemical weathering. Effect of rainwater on limestone. Widening of joints; formation of caves and underground streams.	It should be pointed out that rainwater is a weak acid. The effects of acid on limestone can be shown.
Erosion and deposition by water, ice and wind Erosion, transport and deposition by rivers, the sea, ice and wind. Erosional and depositional landforms: *Rivers:* potholes, point bars. *Sea*: stacks, spits. *Ice*: U-shaped valleys, moraines. *Wind*: mushroom rocks, sand dunes.	A stream tray can be used to show how running water erodes and deposits sand and gravel. A large tank can be used to show how waves affect a model sandy beach. A hair dryer can be used to show how sand can be moved and deposited by wind. A model glacier can be made using a viscous liquid, such as syrup, which is allowed to run down a valley in a mound of sand.
Influence of geological structure on scenery Effects of the following on scenery: variable resistances of rocks to weathering and erosion; gently dipping resistant strata; dykes, sills, lava flows and volcanic plugs; anticlines and synclines; faults (normal, tear, reverse and thrust). These terms should be known: vale, scarp, dip slope, rift valley.	Various rocks (eg, granite, basalt, gneiss, slate, greywacke, mudstone) should be examined and their resistances to weathering and erosion estimated and discussed. Candidates should realise that igneous and metamorphic rocks are generally more resistant than sedimentary rocks, but that this is not always the case. Old gravestones provide useful information on how different rocks are affected by weathering. Maps and models could be used to show the relationship between geology and features such as headlands and bays; cuestas; fault-line scarps; trap topography; etc.

CONTENT	SUPPLEMENTARY NOTES
Effects of relative changes of sea level on landscape Reasons for relative changes in sea level: crustal movements and changes in the volume of the sea. Reference should be made to isostatic movements and to melting of ice sheets. Candidates should be able to describe how the following features have formed: raised beaches and clifflines; drowned coasts (fjords, rias, Dalmatian coasts).	

GEOLOGY, PEOPLE AND ENVIRONMENT

CONTENT	SUPPLEMENTARY NOTES
Ores The following terms should be defined: ore mineral, gangue mineral, ore.	Throughout this unit, there is much scope for the use of audio visual materials produced by oil, mining and water companies, and, by environmental groups.
Candidates should know which metals are extracted from these ore minerals: haematite, magnetite, galena, sphalerite, bauxite, chalcopyrite, cassiterite, and malachite. Methods of formation: hydrothermal deposits; placers; chemical precipitates; residual deposits. Discovery by direct observation, geochemical prospecting, drilling. Extraction by opencast, open pit and underground mining. Uses of metals.	Candidates should realise that some metals (eg, copper, gold, silver, platinum) occur as elements but that most ore minerals are compounds. If possible, ore minerals should be examined. Experiments can be done on the extraction of metals from ore minerals. For example, copper can be readily extracted from malachite by heating with carbon. By this method, iron can be extracted with difficulty. Aluminium cannot be extracted by heating its ore with carbon. The reasons for the different behaviour of these metals can be discussed.
Fossil fuels Modes of formation of coal, oil and natural gas. Characteristics of oil and gas traps. Distribution of coal, oil and gas fields in the British area. Discovery by direct observation, seismic surveys, drilling. Extraction of coal by opencast and underground mining. Extraction of oil and gas through boreholes. The formation and historical importance of Scottish oil shales should be briefly considered. Uses of coal, oil and gas.	

CONTENT

Construction materials
Modes of formation of granite, dolerite, basalt, limestone, sandstone, clay, sand, gravel, slate.
Discovery by direct observation and drilling. Extraction by quarrying. Uses of construction materials.

Water
The water cycle: evaporation, condensation, precipitation, run-off.
Groundwater: water table, aquifer, well, spring, oasis.
Relationship between water table and topography.
Changes in level of water table with weather conditions and as water is extracted.
Problems of groundwater pollution.
The main uses and users of water (agricultural, industrial, domestic, recreational).
Variable distribution of water resources. Areas of water deficiency. Problems caused by water deficiency.
Definitions of drought and irrigation.
Areas where groundwater is a significant source of supply (eg, East Anglia, London Basin, Central Australia).
Problems of over-extraction of groundwater.

SUPPLEMENTARY NOTES

CONTENT	SUPPLEMENTARY NOTES
Environmental effects of mining and quarrying	
Underground mining: subsidence, disposal of mine waste, contaminated mine water. Use of material dumped in bings. Landscaping of bings.	Examples of areas in which subsidence has caused problems should be cited. Mention could be made of the red shale bings in West and Midlothian. Water from abandoned deep mines tends to be acidic and low in oxygen. It may be rich in poisonous metals.
Opencast and open pit mining: Opencast coal mines are unsightly, noisy and dusty. However, such coal mines do not produce much pollution. Local traffic may be disrupted by heavy lorries. Where ore is mined, poisonous metals from tailings may enter streams and groundwater.	Igneous rock quarries produce little waste so the site cannot readily be restored when working has finished. Where limestone is quarried there may be enough over and inter-burden to allow site restoration. The fines produced by sand and gravel quarries are trapped in settling ponds.
Restoration of opencast sites. Open pit sites are more difficult to restore because the waste is dumped away from the excavation.	
Quarrying: like opencast mines, quarries are unsightly, noisy and dusty, and heavy lorries may disrupt local traffic. However, quarries produce no significant pollution. Uses of abandoned excavations.	Old quarries may be used for dumping rubbish and flooded workings may be put to recreational use.
Geology and civil engineering	
Reservoirs and dams: criteria for siting (shape of valley; permeability of reservoir basin and cost of sealing; need for strong dam foundations; possible effects of rock structures and faults).	For dams, bridges and buildings the need for sound foundations should be investigated. Examples such as those provided by the Forth, Erskine and Tay Bridges could be studied. Examples of successful tunnelling projects should be mentioned, eg, Channel Tunnel; London Underground; tunnels for hydro-electric schemes in Scottish Highlands; Clyde Tunnels.
Tunnels: uses of tunnels; methods of excavation; geological problems encountered during tunnelling.	Reasons for major failures should be considered, eg, Viaont Reservoir, northern Italy, 1963; Malpassat Dam, southern France, 1959; Lotschberg Tunnel, Switzerland, 1907.

CONTENT	SUPPLEMENTARY NOTES
Bridges: criteria for siting bridges; need for good foundations. *Buildings*: types of foundation; earthquake resistant buildings; materials used in building. *Urban renewal projects*: influence of steepness and strength of slopes; solid geology and surface deposits; locations of old mines and quarries; location and quality of groundwater; drainage. *Waste disposal*: possible contamination of groundwater by leachates; locating landfill sites.	If possible, construction sites should be visited.
Conservation of resources *Resources and reserves*: factors which affect the rates at which resources are used, eg, population; whether a country is developed or developing; level of science and technology; cost of resource materials; control of supply by cartels and governments.	Exercises should be given which allow candidates to interpret and analyse data on the amounts and rates of use of fossil fuel and ore reserves.
Conservation: problems of overuse and misuse of renewable and non-renewable resources; efficient use of energy. Environmental effects of resource use, eg, enhanced greenhouse effect; acid rain; smoke; nuclear accidents and nuclear wastes; thermal pollution; oil pollution; effects of mining and quarrying; effects of damming and extraction of water from rivers. *Conflicts between conservation and resource use*: benefits obtained from use of a resource balanced against environmental effects of its use. Conflicts which may arise, eg, over opening mines, quarries and landfill sites.	Candidates should be aware of the conflicts which arise between the need to use resources and the need to conserve resources. Possible solutions to the problems which arise should be considered.

National Course Specification: course details (cont)

COURSE Geology (Intermediate 1)

ASSESSMENT

To gain the award of the course, the candidate must achieve all the component units of the course as well as the external assessment. External assessment will provide the basis for grading attainment in the course award.

When units are taken as component parts of a course, candidates will have the opportunity to demonstrate achievement beyond that required to attain each of the unit outcomes. This attainment may, where appropriate, be recorded and used to contribute towards course estimates, and to provide evidence for appeals. Additional details are provided, where appropriate, with the exemplar assessment materials. Further information on the key principles of assessment are provided in the document, *Assessment*, published by HSDU in May 1996.

DETAILS OF THE INSTRUMENT FOR EXTERNAL ASSESSMENT

The externally set and assessed examination paper will be of 1½ hours' duration. The paper will consist of structured, short-answer questions. All questions will be compulsory. Questions will assess knowledge and understanding from all units. About one third of the total marks will be allocated to the assessment of problem solving abilities.

GRADE DESCRIPTIONS

The descriptions below are of expected performances at Grade C and at Grade A. They are intended to assist candidates, teachers, lecturers and users of the certificate and to help establish standards when question papers are being set. The grade of the award will be based on the total score obtained in the examination.

AT C
Candidate must:

Demonstrate a basic ability to integrate knowledge, understanding and skills acquired in the component units of the course.
Demonstrate a basic ability to retain knowledge over an extended period of time.
Apply knowledge and understanding to familiar aspects of situations.
Give reasoned explanations and draw valid conclusions in simple aspects of problem solving situations.
Apply problem solving skills to the elucidation of structures and histories of geological maps and models.

AT A
Candidate must:

Demonstrate a good level of ability to integrate knowledge, understanding and skills acquired in the component units of the course.
Demonstrate a good level of ability to retain knowledge over an extended period of time.
Apply knowledge and understanding to unfamiliar aspects of situations.
Give reasoned explanations and draw valid conclusions in straightforward aspects of problem solving situations.
Apply problem solving skills to the elucidation, using more complex inter-relationships, of structures and histories of geological maps and models.

National Course Specification: course details (cont)

COURSE Geology (Intermediate 1)

APPROACHES TO LEARNING AND TEACHING

Integration

It is important that every opportunity be taken to integrate knowledge and understanding from the separate units. There are many places where such integration could take place.

- The formation of our coal can be related to a time in geological history when Britain crossed the equator. More recently, raised shorelines are associated with times of major glaciation.
- Processes of erosion and deposition can be related to the origins of sedimentary rocks.
- The formation of construction materials can be viewed in terms of the processes which form rocks and surface deposits.
- The formation of ores can be related to internal and surface Earth processes.
- The study of geological structures will improve knowledge and understanding of how these structures influence landscapes.
- Candidates should realise that our high standard of living depends on the use of Earth resources. Candidates should also appreciate the social and environmental costs of resource extraction and misuse.
- Candidates should understand the part played by geological conditions in dictating the choice of sites for civil engineering, waste disposal, quarrying and mining projects.
- Field studies and visits to quarries, mines and construction sites provide an excellent means of bringing together many disparate aspects of knowledge and understanding.

Use of the additional 40 hours

The following beneficial activities could be carried out.

- Making field visits improves understanding of the processes which form rocks and shape landscapes.
- Visiting quarries, mines and construction sites improves understanding of economic, industrial and environmental aspects of geology. Environmental problems associated with resource extraction and use can be studied from media files.
- The more demanding parts of the units could be reviewed and additional practice could be given in problem solving.
- Practice could be given in answering the types of questions which are liable to appear in the external examination. Some of these questions may be of a more demanding type than are required for a pass in a unit assessment; such questions may, for example, require the integration of knowledge and understanding from separate units. Candidates should build up a folio of such questions in case they are needed for appeal procedures following the course exam.

Fieldwork studies

There is no mandatory fieldwork in this course. Field visits do, however, provide a valuable means of enhancing knowledge and understanding of geological processes and of the industrial applications of geology. In addition, field visits foster positive attitudes to the environment.

If field visits are undertaken, the following points should be borne in mind:

- Every precaution must be taken to ensure the complete safety of candidates
- The guidance set out in *A Code for Geological Fieldwork,* published by the Geologists' Association, should be followed

- Teachers and lecturers should visit field sites beforehand. Candidates should be briefed on codes of behaviour and on hazards which may be encountered in the field and on industrial sites
- All who go on field visits should be properly equipped with the necessary materials and clothing

SPECIAL NEEDS

This course specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements for Candidates with Special Needs/Candidates whose First Language is not English* (SQA, 1998).

SUBJECT GUIDES

A Subject Guide to accompany the Arrangements documents has been produced by the Higher Still Development Unit (HSDU) in partnership with the Scottish Consultative Council on the Curriculum (SCCC) and Scottish Further Education Unit (SFEU). The Guide provides further advice and information about:

- support materials for each course
- learning and teaching approaches in addition to the information provided in the Arrangements document
- assessment
- ensuring appropriate access for candidates with special educational needs

The Subject Guide is intended to support the information contained in the Arrangements document. The SQA Arrangements documents contain the standards against which candidates are assessed.

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT The Study of the Earth (Intermediate 1)

NUMBER D243 10

COURSE Geology (Intermediate 1)

SUMMARY

This unit seeks to provide candidates with an introduction to geology. Candidates will acquire knowledge and understanding of the structure and history of the Earth; minerals, rocks and fossils; geological structures; and Earth resources. Aided by practical work, candidates' skills of problem solving, observation, interpretation, recording and communication will be developed. Consideration of the overuse and misuse of resources will allow candidates to develop considered attitudes to environmental problems.

OUTCOMES

1 Demonstrate knowledge and understanding related to geology.
2 Solve problems related to geology.
3 Collect and analyse information related to geology obtained through practical work.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Intermediate 1.

Administrative Information

Superclass: RF

Publication date: November 1999

Source: Scottish Qualifications Authority

Version: 03

National Unit Specification: general information (cont)

UNIT The Study of the Earth (Intermediate 1)

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	None	
Core skills components for the unit	Critical Thinking	Int 1
	Using Graphical Information	Int 1

Additional information about core skills is published *in Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

National Unit Specification: statement of standards

UNIT The Study of the Earth (Intermediate 1)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Demonstrate knowledge and understanding related to geology.

Performance criteria

(a) The description of Earth structure and history is correct.
(b) The description of the modes of formation of igneous, sedimentary and metamorphic rocks is correct.
(c) The description of the mode of formation and geological significance of fossils is correct.
(d) The description of the modes of formation of synclines, anticlines, faults and dykes is correct.
(e) The significance of geology is correctly explained with reference to economic, social and environmental factors.

Evidence requirements

Evidence is produced from a closed book test which demonstrates successful achievement of all of the above performance criteria.

OUTCOME 2

Solve problems related to geology.

Performance criteria

(a) Relevant information is selected and presented in an appropriate format.
(b) Information is accurately processed using calculations where appropriate.
(c) Valid conclusions are drawn and explanations given are supported by evidence.
(d) Predictions and generalisations are made based on the available evidence.
(e) The sequence of formation of geological structures is correctly established from cross-cutting and superposed relationships.

Evidence requirements

Evidence is produced from a closed book test which demonstrates successful achievement of all of the above performance criteria, including the interpretation and communication of graphical information at an appropriate level. With reference to PCs (c) and (d), the candidate's answers must show that the main features of the situation have been recognised and a suitable source selected to deal with it.

National Unit Specification: statement of standards (cont)

UNIT The Study of the Earth (Intermediate 1)

OUTCOME 3

Collect and analyse information related to geology obtained through practical work.

Performance criteria

(a) Minerals and rocks in hand specimen are correctly tested, described and identified.
(b) Fossils are correctly drawn, described and identified.

Evidence requirements

PC:

(a) Minerals: in a practical test, candidates should correctly test, describe and identify 7 out of 10 minerals.
(b) Rocks: in a practical test, candidates should correctly test, describe and identify 10 out of 12 rocks.
(c) Fossils: in a practical test, candidates should correctly draw, describe and identify 10 out of 12 fossils.

National Unit Specification: support notes

UNIT The Study of the Earth (Intermediate 1)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this unit, and on learning and teaching approaches, is given in the table in the Content section of the course details.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT.

Outcomes 1 and 2 will be assessed by means of an integrated end of unit assessment. The end of unit test has no specified mark allocation. However, the following approximate percentage mark allocations are recommended. (Note that the numbers given express a ratio of marks allocated. Candidates would not be expected to undertake test items with the actual mark allocations shown.)

Outcome 1 **(knowledge and understanding)** **60%**

PC:

(a)	Earth structure and history.	(10)
(b)	Formation of igneous, sedimentary and metamorphic rocks.	
(c)	Igneous rocks.	(10)
(d)	Sedimentary rocks.	(10)
(e)	Metamorphic rocks.	(6)
(f)	Formation and geological significance of fossils.	(6)
(g)	Formation of synclines, anticlines, faults and dykes.	(6)
(h)	Economic, social and environmental factors.	(12)

Outcome 2 **(problem solving)** **40%**

PC:

(a)	Selecting and presenting information.	(6)
(b)	Processing information.	(8)
(c)	Drawing conclusions and giving explanations.	(12)
(d)	Making predictions and generalisations.	(6)
(e)	Establishing the sequence of formation of geological structures.	(8)

Test items should be constructed to allow candidates to generate evidence relating to the performance criteria as follows:

(a) Selecting, presenting and processing information
- Sources of information include text; straightforward tables, diagrams, charts and graphs; numerical information.
- Formats of presentation include written responses; straightforward tables, diagrams, charts and graphs.

(b) Calculations include totals, differences, averages, ratios and percentages.

(c) From information given, candidates should be able to draw straightforward conclusions with explanations supported by the evidence

(d) From given situations, candidates should be able to make simple predictions and generalisations eg by predicting effects on the environment from changes in the type of aggregate used in the construction industry
(e) From information given, usually in graphical form, candidates should be able to determine the sequence of the formation of various geological structures.

Outcome 3

Collect and analyse information related to geology obtained through practical work.

PC:

(a) Minerals and rocks in hand specimen are correctly tested, described and identified.

Minerals: in a practical assessment, candidates should correctly test, describe and identify 7 out of 10 minerals. Colour, streak and hardness should be described. Other distinctive properties should be described.

Rocks: in a practical test, candidates should correctly test, describe and identify 10 out of 12 rocks. Colour, grain size, texture (crystalline or fragmental), internal structure
(bedding or other layering), and the presence of fossils should be described.

For the purpose of identifying previously unseen mineral and rock specimens, keys and candidates' records of work may be used.

PC:

(b) Fossils are correctly drawn, described and identified.

Fossils: in a practical assessment, candidates should correctly draw, describe and identify 10 out of 12 fossils. Drawings should be made from specimens or from plaster casts of fossils. Drawings should be of an appropriate standard and descriptions should mention distinctive characteristics. It is realised that some candidates may not be able to draw to acceptable standards. In such cases, good descriptions may compensate for drawings which do not meet the appropriate standard.

For the purpose of identifying previously unseen fossil specimens, keys and candidates' records of work may be used.

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements for Candidates with Special Needs/Candidates whose First Language is not English* (SQA, 1998).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Geology and Scenery (Intermediate 1)

NUMBER D244 10

COURSE Geology (Intermediate 1)

SUMMARY

This unit seeks to provide candidates with an introduction to the study of processes which shape the surface of the Earth. Candidates will acquire knowledge and understanding of weathering; the work of water, ice and wind; and the effects of rock structures and changing sea levels. Skills of problem solving, observation, recording and interpretation will be developed. The study of scenery will enhance environmental awareness.

OUTCOMES

1 Demonstrate knowledge and understanding related to geology and scenery.
2 Solve problems related to geology and scenery.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Intermediate 1.

Administrative Information

Superclass: RF

Publication date: November 1999

Source: Scottish Qualifications Authority

Version: 03

National Unit Specification: general information (cont)

UNIT Geology and Scenery (Intermediate 1)

CORE SKILLS

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	None	
Core skills components for the unit	Critical Thinking	Int 1
	Using Graphical Information	Int 1

Additional information about core skills is published *in Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

National Unit Specification: statement of standards

UNIT Geology and Scenery (Intermediate 1)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Demonstrate knowledge and understanding related to geology and scenery.

Performance criteria

(a) The processes and products of physical and chemical weathering are correctly described.
(b) The processes by which water, ice and wind erode, transport and deposit material are correctly described.
(c) Landforms produced by weathering, erosion and deposition are correctly identified and described.
(d) Rock structures are correctly identified.
(e) The effects of rock type and structure on scenery are correctly described.
(f) The effects of relative sea level changes on landscape are correctly described.

Evidence requirements

Evidence is produced from a closed book test which demonstrates successful achievement of all of the above performance criteria.

OUTCOME 2

Solve problems related to geology and scenery.

Performance criteria

(a) Relevant information is selected and presented in an appropriate format.
(b) Information is accurately processed using calculations where appropriate.
(c) Valid conclusions are drawn and explanations given are supported by evidence.
(d) Predictions and generalisations are made based on the available evidence.

Evidence requirements

Evidence is produced from a closed book test which demonstrates successful achievement of all of the above performance criteria, including the interpretation and communication of graphical information at an appropriate level. With reference to PCs (c) and (d), the candidate's answers must show that the main features of the situation have been recognised and a suitable approach selected to deal with it.

National Unit Specification: support notes

UNIT Geology and Scenery (Intermediate 1)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this unit, and on learning and teaching approaches, is given in the table in the Content section of the course details.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2 will be assessed by means of an integrated end of unit test. The end of unit test has no specified mark allocation. However, the following approximate percentage mark allocations are recommended. (Note that the numbers given express a ratio of marks allocated. Candidates would not be expected to undertake test items with the actual mark allocations shown.)

Outcome 1 **(knowledge and understanding)** **60%**

PC:

(a)	Physical and chemical weathering.	(4)
(b)	Erosion, transport and deposition by rivers, the sea, ice and wind.	(12)
(c)	Landforms produced by weathering, erosion and deposition.	
	Weathering.	(4)
	Erosion by rivers, sea, ice and wind.	(12)
	Deposition by rivers, sea, ice and wind.	(12)
(d)	Rock structures.	(4)
(e)	The effects of rock type and structure on scenery.	(6)
(f)	The effects of relative sea level changes on landscape.	(6)

Outcome 2 **(problem solving)** **40%**

PC:

(a)	Selecting and presenting information.	(6)
(b)	Processing information.	(10)
(c)	Drawing conclusions and giving explanations.	(16)
(d)	Making predictions and generalisations.	(8)

Test items should be constructed to allow candidates to generate evidence relating to the performance criteria as follows:

(a) Selecting, presenting and processing information
- Sources of information include text; straightforward tables, diagrams, charts and graphs; numerical information.
- Formats of presentation include written responses; straightforward tables, diagrams, charts and graphs.

(b) Calculations include totals, differences, averages, ratios and percentages.

(c) From information given, candidates should be able to draw straightforward conclusions with explanations supported by the evidence

(d) From given situations, candidates should be able to make simple predictions and generalisations eg by generalising the relationship between the flow of a river and particle size.

National Unit Specification: support notes (cont)

UNIT Geology and Scenery (Intermediate 1)

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements for Candidates with Special Needs/Candidates whose First Language is not English* (SQA, 1998).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Geology, People and Environment (Intermediate 1)

NUMBER D245 10

COURSE Geology (Intermediate 1)

SUMMARY

This unit seeks to provide candidates with an introduction to economic, environmental and engineering geology. Candidates will acquire knowledge and understanding of how ores, fossil fuels and construction materials are formed, found, extracted and used; the use and misuse of water resources; the application of geological studies to civil engineering; problems caused by activities such as mining and quarrying; and conservation and resource management. Skills of problem solving, observation, recording and communication will be developed. The unit has a strong environmental bias which will enhance the development of caring and thoughtful attitudes towards problems of resource usage.

OUTCOMES

1 Demonstrate knowledge and understanding related to economic, environmental and engineering geology.
2 Solve problems related to economic, environmental and engineering geology.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Intermediate 1.

Administrative Information

Superclass: RF

Publication date: November 1999

Source: Scottish Qualifications Authority

Version: 03

National Unit Specification: general information (cont)

UNIT Geology, People and Environment (Intermediate 1)

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	None	
Core skills components for the unit	Critical Thinking	Int 1
	Using Graphical Information	Int 1

Additional information about core skills is published *in Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

National Unit Specification: statement of standards

UNIT Geology, People and Environment (Intermediate 1)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Demonstrate knowledge and understanding related to economic, environmental and engineering geology.

Performance criteria

(a) The formation, discovery, extraction and use of ores, fossil fuels and construction materials are accurately described.
(b) The processes involved in the water cycle are accurately described.
(c) The major sources, uses and users of water are accurately described.
(d) The source, occurrence and use of groundwater is accurately described.
(e) The environmental effects of resource extraction and waste disposal are accurately described.
(f) The role of geological site investigation prior to civil engineering is accurately described.
(g) The need for conservation is correctly explained in terms of physical resources.

Evidence requirements

Evidence is produced from a closed book test which demonstrates successful achievement of all of the above performance criteria.

OUTCOME 2

Solve problems related to economic, environmental and engineering geology.

Performance criteria

(a) Relevant information is selected and presented in an appropriate format.
(b) Information is accurately processed using calculations where appropriate.
(c) Valid conclusions are drawn and explanations given are supported by evidence.
(d) Predictions and generalisations are made based on the available evidence.

Evidence requirements

Evidence is produced from a closed book test which demonstrates successful achievement of all of the above performance criteria, including the interpretation and communication of graphical information at the appropriate level. With reference to PCs (c) and (d), the candidate's answers must show that the main features of the situation have been recognised and a suitable approach selected to deal with it.

National Unit Specification: support notes

UNIT Geology, People and Environment (Intermediate 1)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this unit, and on learning and teaching approaches, is given in the table in the Content section of the course details.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2 will be assessed by means of an integrated end of unit test. The end of unit test has no specified mark allocation. However, the following approximate percentage mark allocations are recommended. (Note that the numbers given express a ratio of marks allocated. Candidates would not be expected to undertake test items with the actual mark allocations shown.)

Outcome 1 **(knowledge and understanding)** **60%**

PC:

(a)	Ores, fossil fuels and construction materials.	
	Ores.	(10)
	Fossil fuels.	(10)
	Construction materials.	(6)
(b)	Water cycle.	(4)
(c)	Sources, uses and users of water.	(4)
(d)	Groundwater.	(8)
(e)	Environmental effects of resource extraction and waste disposal.	(6)
(f)	Geological site investigation prior to civil engineering.	(6)
(g)	Need for conservation.	(6)

Outcome 2 **(problem solving)** **40%**

PC:

(a)	Selecting and presenting information.	(6)
(b)	Processing information.	(10)
(c)	Drawing conclusions and giving explanations.	(16)
(d)	Making predictions and generalisations.	(8)

Test items should be constructed to allow candidates to generate evidence relating to the performance criteria as follows:

(a) Selecting, presenting and processing information
- Sources of information include text; straightforward tables, diagrams, charts and graphs; numerical information.
- Formats of presentation include written responses; straightforward tables, diagrams, charts and graphs.

(b) Calculations include totals, differences, averages, ratios and percentages.

(c) From information given, candidates should be able to draw straightforward conclusions with explanations supported by the evidence.

(d) From given situations, candidates should be able to make simple predictions and generalisations eg by predicting the effect of extracting ground water from the area of a tributary on the flow of the main river.

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements for Candidates with Special Needs/Candidates whose First Language is not English* (SQA, 1998).