

**GEOLOGY**  
**Access 3**

**Second edition – published November 1999**

**NOTE OF CHANGES TO ACCESS 3 ARRANGEMENTS  
SECOND EDITION TO BE PUBLISHED NOVEMBER 1999**

**CLUSTER TITLE:** Geology (Access 3)

**CLUSTER NUMBER:** C043 09

**National Cluster Specification**

*Cluster Details:* No changes

*All units:*

**D243 09** *The Study of the Earth*

**D244 09** *Geology and Scenery*

**D245 09** *Geology, People and Environment*

The core skills statements for these units have been amended to include the component core skill *Using Graphical Information (Acc 3)* which had previously been omitted from the unit specifications in error.

NB: As a result of the above change *all 3 units* in this document are now *Version 04*.

## National Cluster

### GEOLOGY (ACCESS 3)

**CLUSTER NUMBER**            C043 09

#### STRUCTURE

The programme of study has three mandatory units, as follows:

<i>D243 09</i>	<i>The Study of the Earth (Acc 3)</i>	<i>1 credit (40 hours)</i>
<i>D244 09</i>	<i>Geology and Scenery (Acc 3)</i>	<i>1 credit (40 hours)</i>
<i>D245 09</i>	<i>Geology, People and Environment (Acc 3)</i>	<i>1 credit (40 hours)</i>

The Access 3 units are designed to articulate with the Intermediate 1 Geology units.

In common with all clusters, this programme of study includes 40 hours over and above the 120 hours for the component units. This may be used for induction, extending the range of learning and teaching approaches, support, consolidation and integration of learning. This time is an important element of the programme of study and advice on its use is included in the cluster details.

#### RECOMMENDED ENTRY

Entry is at the discretion of the centre.

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#### Administrative Information

<b>Publication date:</b>	September 1999
<b>Source:</b>	Scottish Qualifications Authority
<b>Version:</b>	03

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## **National Cluster: general information (cont)**

**CLUSTER**            Geology (Access 3)

### **CORE SKILLS**

This cluster gives automatic certification of the following:

<b>Complete core skills for the cluster</b>	None	
<b>Core skills components for the cluster</b>	Critical Thinking	Acc 3
	Using Graphical Information	Acc 3

For information about the automatic certification of core skills for any individual unit in this cluster, 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 Cluster: details

### CLUSTER            Geology (Access 3)

#### RATIONALE

Geology is a wide-ranging and general science with a strong environmental relevance. Because it draws on aspects of geography, chemistry, physics and biology, it provides an excellent means of extending and integrating knowledge, understanding, skills and attitudes already developed in scientific and geographic aspects of 5–14 Environmental Studies. Candidates will develop further awareness of their physical surroundings and of the need to conserve and protect the Earth and its limited resources.

- Candidates will find out about rocks, fossils, scenery, coal and oil.
- Candidates will see that Earth movements bend and break rocks on a large scale.
- Candidates will come to realise that the Earth provides us with fuels, metals and building materials.
- Candidates will undertake practical work so they will develop skills of observation, interpretation, recording and communication.
- Consideration of how people affect the environment will foster the development of positive attitudes towards the environment.
- Scotland has few equals as an area in which to study geology. Candidates will come to see that geology has made a significant contribution to our natural and industrial heritage.

#### Aims of the cluster of Geology units

The main aims are to:

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

#### CONTENT

The main topics covered by the Access 3 Geology units are as follows:

##### *The Study of the Earth (40 hours)*

What is inside the Earth. Minerals and rocks. Fossils and the history of the Earth.  
The economic, social and environmental importance of geology.

##### *Geology and Scenery (40 hours)*

Break-up of rocks by weathering. Wearing away of the land and deposition by water, wind and ice.  
How rocks and rock structures affect scenery. How changing sea levels affect coastal scenery.

##### *Geology, People and Environment (40 hours)*

How ores, fossil fuels, and construction materials are formed, found, extracted and used. Water supplies. How we affect the environment by mining, quarrying, building, and disposing of waste. Careful use of Earth resources.

Information on the content of each unit is given in the following tables.

## National Cluster: details (cont)

**CLUSTER**      Geology (Access 3)

### *THE STUDY OF THE EARTH*

CONTENT	SUPPLEMENTARY NOTES
<p><b><i>Structure and history of the Earth</i></b> What is inside the Earth.</p> <p>Formation of the Solar System from a cloud of dust and gas.</p> <p>How the Earth has changed through geological time.</p> <p>Changing conditions in the British area through geological time.</p> <p><b><i>Minerals and rocks</i></b> <i>Minerals</i>: minerals defined as pure substances (elements and compounds).</p> <p>The following minerals should be studied: quartz, feldspar, mica, calcite, haematite, pyrite.</p> <p>Mineral properties: colour, hardness.</p>	<p>Candidates should know that the crust consists of igneous, sedimentary and metamorphic rocks. The mantle consists of rock and the core consists of metal.</p> <p>The age of the Earth should be mentioned.</p> <p><i>Major changes in the Earth</i>: The Earth melted soon after it formed. When it cooled, the oceans and continents started to form. Movements of continents; opening and closing of oceans. Appearance and effects of lifeforms (eg, formation of fossil fuels; production of oxygen by plants).</p> <p><i>Changes in the British area</i>: Conditions were, at various times, marine, desert, hot swamp and glacial. There were also periods when mountains were built and volcanoes were active. Some of these changes can be related to the movements of continents. Audio visual material could be gainfully employed and museum visits may prove useful.</p> <p>Candidates should realise that minerals are pure chemical substances whereas rocks are usually mixtures. Candidates would not be expected to define the terms ‘element’ or ‘compound’.</p>

## National Cluster: details (cont)

**CLUSTER**      Geology (Access 3)

### *THE STUDY OF THE EARTH (cont)*

CONTENT	SUPPLEMENTARY NOTES
<p><i>Rocks</i> How rocks are classified. The following rocks should be studied: granite, basalt, sandstone, limestone, mudstone, conglomerate, slate, schist.</p> <p>Rock properties: colour, grain size, made up of fragments or crystals, internal structure (layers in sedimentary rocks, crystals lined up in metamorphic rocks), presence of fossils.</p> <p><i>Fossils</i> Fossils should be defined as the remains or marks of plants and animals found in rocks.</p> <p>Use of fossils in dating rocks. What fossils tell us about ancient conditions: eg climates; places where the organisms lived; conditions under which rocks were deposited.</p>	<p>Candidates should realise that rocks are made up of one or more minerals. Mention should be made of how rocks are classified: eg, how formed (igneous, sedimentary, metamorphic); different minerals present (granite, basalt); size of grains (sandstone, mudstone); way in which crystals are lined up (slate, schist).</p> <p>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. If possible, candidates should see rocks in the field. Keys, tables and other aids should be used to help candidates to identify minerals and rocks.</p> <p>Candidates should realise that most plants and animals are not fossilised; it often happens that only hard parts are fossilised. It should also be noted that the fossil may not consist of the original plant or animal 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.</p> <p>Candidates should realise that lifeforms have changed through geological time and that rocks of different ages contain different fossils. Some examples should be given: eg, sea urchins indicate marine environments; coral reefs are indicative of warm, clear seas; thick coal seams suggest that forests grew in hot, wet conditions; dinosaur fossils indicate warm conditions on land. Exercises could usefully be given: eg, matching organisms with their environments; dating rocks by means of their fossil contents.</p> <p>Specimens or plaster casts of fossils should be studied.</p>

## National Cluster: details (cont)

### CLUSTER Geology (Access 3)

#### *THE STUDY OF THE EARTH (cont)*

CONTENT	SUPPLEMENTARY NOTES
<p>The following fossils should be studied: a bivalve, a gastropod, a coral, a sea urchin, a trilobite, a plant, a vertebrate, a trace fossil.</p> <p><b><i>Geological structures</i></b> Dip.</p> <p>Folds, faults and dykes. Recognition of these structures on block models.</p> <p>Relative dating of beds and structures by means of superposed and cross-cutting relationships.</p> <p><b><i>Economic, social and environmental factors</i></b> Resources are biological (from plants and animals) or physical (of non-biological origin). Resources may be renewable or non-renewable. Careful management of resources. Problems of overuse and mis-use. Conservation of the environment.</p>	<p>Keys, tables and other aids should be used to help candidates to identify fossils.</p> <p>Candidates should know that dip is the slope of rock layers. They would not be required to measure dips.</p> <p>Candidates should realise that folds are produced when rocks are squeezed. Faults are formed when rocks are broken and moved. Simple bending and breaking experiments may be done to show how folds and faults are formed. Dykes are wall-like igneous intrusions.</p> <p>Overlying and cross-cutting relationships should be studied by use of block models. Only one cross-cutting relationship need be shown. Candidates should realise that younger layers lie on top of older layers and that a younger structure (eg, a dyke) will cut through an older structure (eg, sedimentary layering).</p> <p>Most of our physical resources come from the Earth. It should be noted that fossil fuels are classified as physical resources. The overuse of some renewable resources (eg, non-volcanic geothermal energy and artesian water) means that such resources effectively become non-renewable. Water resources may be misused by being polluted.</p> <p>Reference should be made to the effects of deep mining (eg, subsidence, pit bings, pollution of surface water), opencast mining, quarrying, burning of fossil fuels (acid rain, extra 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. A trip to an opencast mine or quarry could usefully be undertaken.</p>

## National Cluster: details (cont)

### CLUSTER Geology (Access 3)

#### *GEOLGY AND SCENERY*

CONTENT	SUPPLEMENTARY NOTES
<p><b><i>Weathering</i></b> Process of freeze-thaw action. Production of sharp-edged fragments and scree slopes.</p> <p>Effect of rainwater on limestone. Widening of cracks; formation of caves and underground streams.</p> <p><b><i>How water, ice and wind affect the Earth's surface</i></b> Wearing away and depositing by rivers, the sea, ice and wind. <i>Rivers:</i> potholes, deposition on the inside of meanders. <i>Sea:</i> stacks, spits. <i>Ice:</i> U-shaped valleys, moraines. <i>Wind:</i> mushroom rocks, sand dunes.</p> <p><b><i>How rock structures affect scenery</i></b> Effects of the following on scenery: different resistances of rocks to weathering and erosion; resistant layers with gentle dips; dykes; ancient volcanic plugs; folds and faults.</p>	<p>The unit is ideally suited to the use of fieldwork. If possible, processes and landforms should be studied in the field.</p> <p>Experiments can be done to show the effects of repeatedly freezing and thawing soaked shale.</p> <p>It should be pointed out that rainwater is a weak acid. The effects of acid on limestone can be shown.</p> <p>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.</p> <p>Rocks such as granite and 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.</p> <p>Maps and models could be used to show the relationship between geology and landform features such as headlands and bays. Candidates would not be required to name landforms, such as fault-line scarps, and crag-and-tail landforms. They should, however, understand the processes by which they are formed.</p>

**National Cluster: details (cont)**

**CLUSTER**      Geology (Access 3)

***GEOLOGY AND SCENERY (cont)***

<b>CONTENT</b>	<b>SUPPLEMENTARY NOTES</b>
<p><b><i>How changes of sea level affect coastal scenery</i></b> Candidates should know that sea level changes relative to the land because the land moves up and down, and because the amount of water in the sea changes. Reference should be made to the effects of ice sheets in causing land movements and in causing sea level to change.</p> <p>Candidates should be able to describe how raised beaches and fjords have formed. Scottish examples should be studied.</p>	<p>When a floating block of wood is loaded with ice it sinks lower in the water. As the ice melts, the block moves up and the water level rises.</p>

## National Cluster: details (cont)

**CLUSTER**      Geology (Access 3)

### ***GEOLOGY, PEOPLE AND ENVIRONMENT***

CONTENT	SUPPLEMENTARY NOTES
<p><i><b>Ores</b></i> Metals are extracted from ore minerals. An ore is a material (eg, rock, gravel) which is rich in ore minerals.</p> <p>Methods of formation: deposits left by hot water moving through cracks in rocks; ore minerals in sand and gravel deposits; deposits left when a rock weathers away. Discovery by direct observation and drilling. Extraction by surface and underground mining. Uses of metals.</p> <p><i><b>Fossil fuels</b></i> Coal is formed from the remains of ancient forests. Oil forms from the remains of plants and animals that lived in the sea. Some natural gas comes from coal seams. Some natural gas forms in the same way as oil.</p> <p>Oil and gas move up through rocks until they are caught in traps (eg, upfolds).</p> <p>Where coal, oil and gas are found in the British area. Discovery by direct observation and drilling. Extraction of coal by opencast and underground mining. Extraction of oil and gas through boreholes. Uses of coal, oil and gas.</p>	<p>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.</p> <p>Experiments can be done on the extraction of metals from ores (eg, copper can be extracted from powdered malachite heated with carbon).</p> <p>Candidates should realise that some metals (eg, gold, silver) occur as pure metals but that most ore minerals have the metal joined to other elements. If possible, ore minerals should be examined. The names of ore minerals need not be known.</p> <p>Candidates should examine peat and coal.</p> <p>If possible, an opencast mine should be visited.</p>

## National Cluster: details (cont)

**CLUSTER**      Geology (Access 3)

### ***GEOLOGY, PEOPLE AND ENVIRONMENT (cont)***

CONTENT	SUPPLEMENTARY NOTES
<p><b><i>Construction materials</i></b>            How building materials are formed (granite, dolerite, limestone, sandstone, clay, sand, gravel, slate).</p> <p>Discovery by direct observation and drilling. Extraction by quarrying. Uses of construction materials.</p> <p><b><i>Water</i></b>  <i>The water cycle:</i> evaporation, clouds, rain and snow, rivers.  <i>Groundwater:</i> water table, well, spring.            Lowering of water table as water is extracted.            Problems of groundwater pollution.            The main uses and users of water (agricultural, industrial, domestic, recreational).            Variable distribution of water resources (eg, compare northwest Scotland with southeast England).            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.</p>	<p>Candidates should realise that natural materials can be used to manufacture products such as bricks, cement and ceramics.</p> <p>If possible, a quarry should be visited.</p> <p>Candidates should be aware of the properties of aquifers as groundwater reservoirs. They would not be expected to use the term ‘aquifer’.</p> <p>Experiments can be done to see how easily water runs through gravel and clay. Model wells and springs can also be made.</p>

## National Cluster: details (cont)

**CLUSTER**      Geology (Access 3)

### ***GEOLOGY, PEOPLE AND ENVIRONMENT (cont)***

<b>CONTENT</b>	<b>SUPPLEMENTARY NOTES</b>
<p><b><i>Environmental effects of mining and quarrying</i></b> <i>Underground mining:</i> subsidence, disposal of mine waste, pollution of underground water. Landscaping of bings.</p> <p><i>Surface mining:</i> opencast coal mines are unsightly, noisy and dusty. However, such mines do not cause much pollution. Local traffic may be disrupted by heavy lorries. Where ore is mined, poisonous metals may enter streams and groundwater.</p> <p>Restoration of opencast sites.</p> <p><i>Quarrying:</i> like opencast mines, quarries are unsightly, noisy and dusty, and heavy lorries may disrupt local traffic. However, quarries produce little pollution.</p> <p>Uses of abandoned excavations.</p>	<p>Examples of areas in which subsidence has caused problems should be cited. Mention could be made of the red shale bings in West Lothian and Midlothian. Water from abandoned deep mines tends to be acidic and low in oxygen. It may be rich in poisonous metals.</p> <p>Igneous rock quarries produce little waste so the site cannot be restored when working has finished. The fine-grained material produced by sand and gravel quarries is trapped in settling ponds.</p> <p>Old quarries may be used for dumping rubbish and flooded workings may be put to recreational use.</p>

## National Cluster: details (cont)

**CLUSTER**      Geology (Access 3)

### ***GEOLOGY, PEOPLE AND ENVIRONMENT (cont)***

<b>CONTENT</b>	<b>SUPPLEMENTARY NOTES</b>
<p><b><i>Geology and civil engineering</i></b> <i>Reservoirs and dams:</i> consideration of the best sites (shape of valley; leakage through the floor of the reservoir; need for strong dam foundations). <i>Tunnels:</i> uses of tunnels; problems caused by flooding and roof collapse during tunnelling. <i>Bridges:</i> need for good foundations. <i>Buildings:</i> types of foundation; materials used in building. <i>Waste disposal:</i> possible pollution of groundwater; the best places for landfill sites.</p>	<p>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.</p> <p>Examples of successful tunnelling projects should be mentioned, eg, Channel Tunnel; London Underground; tunnels for hydro-electric schemes in Scottish Highlands; Clyde Tunnels.</p> <p>Reasons for major failures could be considered, eg, Vioant Reservoir, northern Italy, 1963; Malpassat Dam, southern France, 1959; Lotschberg Tunnel, Switzerland, 1907.</p> <p>If possible, construction sites should be visited.</p>

## National Cluster: details (cont)

**CLUSTER**      Geology (Access 3)

### ***GEOLOGY, PEOPLE AND ENVIRONMENT (cont)***

<b>CONTENT</b>	<b>SUPPLEMENTARY NOTES</b>
<p><b><i>Conservation of resources</i></b></p> <p><i>Resources</i> Factors which affect the rates at which resources are used, eg, population; whether a country is developed or developing; cost of resource materials.</p> <p><i>Conservation</i> Problems of overuse and misuse of renewable and non-renewable resources; efficient use of energy. Environmental effects of resource use, eg, extra greenhouse effect; acid rain; smoke; nuclear accidents and nuclear wastes; oil pollution; effects of mining and quarrying.</p> <p><i>Conflicts between conservation and resource use</i> 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.</p>	<p>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.</p> <p>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.</p>

## **National Cluster: details (cont)**

### **CLUSTER            Geology (Access 3)**

#### **ASSESSMENT**

Candidates should be aware of assessment criteria and assessment instruments. It is anticipated that ongoing assessment will take place, informing and supporting the candidates. The units which comprise the cluster of units will be assessed internally. Candidates may be assessed by any appropriate means, for example, by oral tests, by teacher/lecturer observation, by written tests.

Details of internal assessment are provided in each unit specification.

#### **APPROACHES TO LEARNING AND TEACHING**

The programme of study should be promoted in an activity-based environment, whenever possible. Practical activities in the laboratory/classroom and field provide opportunities to develop a wide range of skills associated with scientific enquiry.

Concept terms and essential terminology should be presented within the framework of activities suggested in the content grid. The learning and teaching of geology are more effective when the ideas are set in a relevant context by making reference to actual situations.

Information should be presented appropriately with an emphasis on variety and interactive learning. Posters, information charts and tables should be on display to help candidates to become familiar with the language used.

#### **Integration**

The various themes of the disparate units of the cluster of Access 3 units can, at times, be usefully brought together. For example, positive attitudes to the environment can be reinforced under different contexts; and field studies can be used to improve various aspects of knowledge and understanding.

#### **Use of the additional 40 hours**

The following beneficial activities could possibly be undertaken:

- Visits could be made to quarries and opencast mines.
- Scenery, rocks and fossils could be studied in the field.
- Group working could be encouraged by the use of projects and investigations. Candidates could give presentations highlighted by posters and displays.
- Additional experimental work could be carried out.
- Time could be found for additional support, for extended discussion, and for further exercises in problem solving.

#### **Fieldwork studies**

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

## **National Cluster: details (cont)**

### **CLUSTER            Geology (Access 3)**

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 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 cluster
- 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.

## National Unit Specification: general information

**UNIT** The Study of the Earth (Access 3)

**NUMBER** D243 09

**CLUSTER** Geology (Access 3)

### SUMMARY

This unit seeks to provide candidates with a basic 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, 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 Access 3.

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### Administrative Information

**Superclass:** RF  
**Publication date:** November 1999  
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## National Unit Specification: general information (cont)

**UNIT**                      The Study of the Earth (Access 3)

### CORE SKILLS

This unit gives automatic certification of the following:

<b>Complete core skills for the unit</b>	None	
<b>Core skills components for the unit</b>	Critical Thinking	Acc 3
	Using Graphical Information	Acc 3

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 (Access 3)**

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 how rocks form is correct.
- (c) The description of the formation and use of fossils is correct.
- (d) The description of how folds, faults and dykes form is correct.
- (e) The explanation of the part geology plays in our lives is correct.

##### **Evidence requirements**

Evidence should be produced which demonstrates successful achievement of all of the above performance criteria. Such evidence may be generated by any appropriate means, for example, written tests, oral tests or observation by the teacher/lecturer.

#### **OUTCOME 2**

Solve problems related to geology.

##### **Performance criteria**

- (a) Relevant information is selected, presented and processed in an appropriate way.
- (b) Valid conclusions are drawn and explanations given are supported by evidence.
- (c) The order of formation within pairs of geological structures is correctly established.

##### **Evidence requirements**

Evidence should be produced 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 PC (b), the candidates' answers must show that the main features of the situation have been identified and a suitable approach used to deal with it. Such evidence may be generated by any appropriate means, for example, written tests, oral tests, or observation by the teacher/lecturer.

## **National Unit Specification: statement of standards (cont)**

### **UNIT**                      The Study of the Earth (Access 3)

#### **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 or described, and identified.

##### **Evidence requirements**

PC:

- (a) Minerals: in a practical test, candidates should correctly test, describe and identify three out of five minerals.  
Rocks: in a practical test, candidates should correctly test, describe and identify four out of six rocks.
- (b) Fossils: in a practical test, candidates should correctly draw or describe, and identify four out of six fossils.

## National Unit Specification: support notes

### UNIT The Study of the Earth (Access 3)

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.

Information on the content and context for this unit, and guidance on learning and teaching approaches, is given in the tables in the cluster details.

#### GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2 may be assessed by any appropriate means (eg, continuous assessment, end of unit test). Whatever style of assessment is adopted, the following approximate percentage mark allocations would be appropriate. (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.)

<b>Outcome 1</b>	<b>(knowledge and understanding)</b>	<b>60%</b>
PC		
(a)	Earth structure and history.	(10)
(b)	Formation of igneous, sedimentary and metamorphic rocks.	
	Igneous rocks.	(8)
	Sedimentary rocks.	(8)
	Metamorphic rocks.	(6)
(c)	Formation and use of fossils.	(8)
(d)	Folds, faults and dykes.	(8)
(e)	Economic, social and environmental factors.	(12)
<b>Outcome 2</b>	<b>(problem solving)</b>	<b>40%</b>
PC		
(a)	Selecting, presenting and processing information.	(16)
(b)	Drawing conclusions and giving explanations.	(16)
(c)	Establishing the sequence of formation within pairs 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; simple tables, diagrams, charts and graphs; numerical information
  - Formats of presentation include written or oral responses; simple tables, diagrams, charts and graphs
  - Calculations include totals, differences, averages and simple percentages.
- (b) From information given, candidates should be able to draw simple conclusions with explanations supported by the evidence.
- (c) From information given, usually in graphical form, candidates should be able to determine which of two geological structures is the younger.

## National Unit Specification: support notes (cont)

### UNIT The Study of the Earth (Access 3)

#### 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 test, candidates should correctly test, describe and identify three out of five minerals. Colour, hardness and other distinctive properties should be described.

*Rocks:* in a practical test, candidates should correctly test, describe and identify four out of six rocks. Colour: grain size, made up of crystals or fragments, type of layering, and presence of fossils should be described.

For the purposes of identification, keys and candidates' records of work may be used.

PC

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

*Fossils:* in a practical test, candidates should correctly draw or describe, and identify four out of six 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 will compensate for drawings which do not meet the appropriate standard.

For the purposes of identification, 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).

## National Unit Specification: general information

<b>UNIT</b>	Geology and Scenery (Access 3)
<b>NUMBER</b>	D244 09
<b>CLUSTER</b>	Geology (Access 3)

### SUMMARY

This unit seeks to provide candidates with a basic introduction to the study of processes which shape the surface of the Earth. Candidates will acquire knowledge and understanding of how rocks are broken down by weathering; how water, ice and wind wear away the land and deposit materials; and how rock structures and changing sea levels affect scenery. 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 Access 3.

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### Administrative Information

<b>Superclass:</b>	RF
<b>Publication date:</b>	November 1999
<b>Source:</b>	Scottish Qualifications Authority
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## National Unit Specification: general information (cont)

**UNIT**                      Geology and Scenery (Access 3)

### CORE SKILLS

This unit gives automatic certification of the following:

<b>Complete core skills for the unit</b>	None	
<b>Core skills components for the unit</b>	Critical Thinking	Acc 3
	Using Graphical Information	Acc 3

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 (Access 3)**

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 effects of weathering on rocks are correctly described.
- (b) The ways in which water, ice and wind wear away the land and deposit material are correctly described.
- (c) Landforms produced by weathering, erosion and deposition are correctly described.
- (d) The effects of rock type and structure on scenery are correctly described.
- (e) The effects of relative sea level changes on coastal scenery are correctly described.

##### **Evidence requirements**

Evidence should be produced which demonstrates successful achievement of all of the above performance criteria. Such evidence may be generated by any appropriate means, for example, written tests, oral tests or observation by the teacher/lecturer.

#### **OUTCOME 2**

Solve problems related to geology and scenery.

##### **Performance criteria**

- (a) Relevant information is selected, presented and processed in an appropriate way.
- (b) Valid conclusions are drawn, and explanations given are supported by evidence.

##### **Evidence requirements**

Evidence should be produced 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 PC (b), the candidates' answers must show that the main features of the situation have been identified and a suitable approach used to deal with it. Such evidence may be generated by any appropriate means, for example, written tests, oral tests, or observation by the teacher/lecturer.

## National Unit Specification: support notes

### UNIT Geology and Scenery (Access 3)

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.

Information on the content and context for this unit, and guidance on learning and teaching approaches, is given in the tables in the cluster details.

#### GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2 may be assessed by any appropriate means (eg, continuous assessment, end of unit test). Whatever style of assessment is adopted, the following approximate percentage mark allocations would be appropriate. (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.)

<b>Outcome 1</b>	<b>(knowledge and understanding)</b>	<b>60%</b>
PC		
(a)	Weathering.	(6)
(b)	Erosion and deposition by rivers, the sea, ice and wind.	(14)
(c)	Landforms produced by weathering, erosion and deposition.	
	Weathering.	(4)
	Erosion.	(10)
	Deposition.	(10)
(d)	The effects of rock type and structure on scenery.	(8)
(e)	The effects of relative sea level changes on coastal scenery.	(8)
<b>Outcome 2</b>	<b>(problem solving)</b>	<b>40%</b>
PC		
(a)	Selecting, presenting and processing information.	(15)
(b)	Drawing conclusions and giving explanations.	(25)

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; simple tables, diagrams, charts and graphs; numerical information
  - Formats of presentation include written or oral responses; simple tables, diagrams, charts and graphs
  - Calculations include totals, differences, averages and simple percentages.
- (b) From information given, candidates should be able to draw simple conclusions with explanations supported by the evidence.

## **National Unit Specification: support notes (cont)**

### **UNIT**                      Geology and Scenery (Access 3)

#### **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).

## National Unit Specification: general information

<b>UNIT</b>	Geology, People and Environment (Access 3)
<b>NUMBER</b>	D245 09
<b>CLUSTER</b>	Geology (Access 3)

### SUMMARY

This unit seeks to allow candidates to develop awareness of the uses of geology. Candidates will acquire knowledge and understanding of: how useful materials are formed, found, extracted and used; the use and misuse of water; how geological studies help in civil engineering; problems caused by mining and quarrying; and conservation and proper use of resources. 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 the uses of geology.
- 2 Solve problems related to the uses of geology.

### RECOMMENDED ENTRY

Entry is at the discretion of the centre.

### CREDIT VALUE

1 credit at Access 3.

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### Administrative Information

<b>Superclass:</b>	RF
<b>Publication date:</b>	November 1999
<b>Source:</b>	Scottish Qualifications Authority
<b>Version:</b>	04

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## National Unit Specification: general information (cont)

**UNIT**                      Geology, People and Environment (Access 3)

### CORE SKILLS

This unit gives automatic certification of the following:

<b>Complete core skills for the unit</b>	None	
<b>Core skills components for the unit</b>	Critical Thinking	Acc 3
	Using Graphical Information	Acc 3

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 (Access 3)**

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 the uses of geology.

##### **Performance criteria**

- (a) The ways in which ores, fossil fuels and construction materials are formed, found and extracted are accurately described.
- (b) The processes involved in the water cycle are accurately described.
- (c) The major sources of water are accurately described.
- (d) The environmental effects of resource extraction and waste disposal are accurately described.
- (e) The ways in which geological studies can help in civil engineering are accurately described.
- (f) The use, misuse and conservation of physical resources are correctly explained.

##### **Evidence requirements**

Evidence should be produced which demonstrates successful achievement of all of the above performance criteria. Such evidence may be generated by any appropriate means, for example, written tests, oral tests or observation by the teacher/lecturer.

#### **OUTCOME 2**

Solve problems related to the uses of geology.

##### **Performance criteria**

- (a) Relevant information is selected, presented and processed in an appropriate way.
- (b) Valid conclusions are drawn and explanations given are supported by evidence.

##### **Evidence requirements**

Evidence should be produced 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 PC (b), the candidates' answers must show that the main features of the situation have been recognised and a suitable approach used to deal with it. Such evidence may be generated by any appropriate means, for example, written tests, oral tests, or observation by the teacher/lecturer.

## National Unit Specification: support notes

### UNIT Geology, People and Environment (Access 3)

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.

Information on the content and context for this unit, and guidance on learning and teaching approaches, is given in the tables in the cluster details.

#### GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2 may be assessed by any appropriate means (eg, continuous assessment, end of unit test). Whatever style of assessment is adopted, the following approximate percentage mark allocations would be appropriate. (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.)

<b>Outcome 1</b>	<b>(knowledge and understanding)</b>	<b>60%</b>
PC		
(a)	Ores, fossil fuels and construction materials.	
	Ores.	(8)
	Fossil fuels.	(8)
	Construction materials.	(8)
(b)	Water cycle.	(4)
(c)	Sources of water.	(6)
(d)	Environmental effects of resource extraction and waste disposal.	(6)
(e)	Geology and civil engineering.	(8)
(f)	Use, misuse and conservation of resources.	(12)
<b>Outcome 2</b>	<b>(problem solving)</b>	<b>40%</b>
PC		
(a)	Selecting, presenting and processing information.	(20)
(b)	Drawing conclusions and giving explanations.	(20)

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; simple tables, diagrams, charts and graphs; numerical information
  - Formats of presentation include written or oral responses; simple tables, diagrams, charts and graphs
  - Calculations include totals, differences, averages and simple percentages.
- (b) From information given, candidates should be able to draw simple conclusions with explanations supported by the evidence.

## **National Unit Specification: support notes (cont)**

**UNIT**                      Geology, People and Environment (Access 3)

### **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).