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## Environmental Science: Earth's Resources

**SCQF:** level 5 (6 SCQF credit points)

**Unit code:** J263 75

### Unit outline

The general aim of this Unit is to develop skills of scientific inquiry, investigation and analytical thinking, along with knowledge and understanding of the Earth's resources. Learners will apply these skills when considering the applications of the Earth's resources on our lives, as well as the implications on society/the environment. This can be done by using a variety of approaches, including investigation and problem solving.

The Unit covers the key areas of: an overview of Earth systems and their interactions; the geosphere; the hydrosphere; the biosphere and the atmosphere. Learners will research issues, apply scientific skills and communicate information related to their findings, which will develop skills of scientific literacy.

Learners who complete this Unit will be able to:

1. Apply skills of scientific inquiry and draw on knowledge and understanding of the key areas of this Unit to carry out an experiment/practical investigation
2. Draw on knowledge and understanding of the key areas of this Unit and apply scientific skills

This Unit is available as a free-standing Unit. The Unit Specification should be read in conjunction with the *Unit Support Notes*, which provide advice and guidance on delivery, assessment approaches and development of skills for learning, skills for life and skills for work. Exemplification of the standards in this Unit is given in *Unit Assessment Support*.

## **Recommended entry**

Entry to this Unit is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by one or more of the following or equivalent qualifications and/or experience:

National 4 Environmental Science Course or relevant component Units

National 4 Geography Course or relevant component Units

National 4 Science Course or relevant component Units

## **Equality and inclusion**

This Unit Specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. For further information, please refer to the *Unit Support Notes*.

# Standards

## Outcomes and Assessment Standards

### Outcome 1

The learner will:

- 1 Apply skills of scientific inquiry and draw on knowledge and understanding of the key areas of this Unit to carry out an experiment/practical investigation by:**
  - 1.1 Planning an experiment/practical investigation
  - 1.2 Following procedures safely
  - 1.3 Making and recording observations/measurements correctly
  - 1.4 Presenting results in an appropriate format
  - 1.5 Drawing valid conclusions
  - 1.6 Evaluating experimental procedures

### Outcome 2

The learner will:

- 2 Draw on knowledge and understanding of the key areas of this Unit and apply scientific skills by:**
  - 2.1 Making accurate statements
  - 2.2 Solving problems

# Evidence Requirements for the Unit

Assessors should use their professional judgement, subject knowledge and experience, and understanding of their learners, to determine the most appropriate ways to generate evidence and the conditions and contexts in which they are used.

The key areas covered in this Unit are: an overview of Earth systems and their interactions, the geosphere, the hydrosphere, the biosphere, and the atmosphere.

<b>Earth's Resources</b>
<b>1 Overview of Earth systems and their interactions</b> <ul style="list-style-type: none"><li>a. Earth systems — geosphere, hydrosphere, atmosphere and biosphere</li><li>b. The rock, carbon, nitrogen and water cycles connect the systems</li><li>c. Resources to include physical, biological, renewable and non-renewable</li></ul>
<b>2 Geosphere</b> <ul style="list-style-type: none"><li>a. The structure of the Earth: core, mantle and crust</li><li>b. The difference between minerals and rocks</li><li>c. Properties of rocks, to include porosity and permeability</li><li>d. The rock cycle (to describe the processes of weathering and erosion, melting, and the effects of heat and pressure) and formation of igneous, sedimentary and metamorphic rocks (to include one example of each)</li><li>e. Limestone: formation, discovery, extraction, processing, uses</li><li>f. The difference between ore minerals (a mineral from which a metal may be economically extracted) and ores (a mixture of ore minerals and waste minerals). To include a named example of an ore</li><li>g. Crude oil: formation, discovery, extraction, processing and uses of iron</li><li>h. Petroleum: formation, discovery, extraction, processing and uses</li><li>i. The geological carbon cycle, to include limestone and fossil fuels</li></ul>
<b>3 Hydrosphere</b> <ul style="list-style-type: none"><li>a. The main reservoirs of water, to include atmosphere, oceans, ice, freshwater and groundwater</li><li>b. The water cycle, to include evaporation, transpiration, condensation and precipitation</li><li>c. Uses of water, to include industrial, domestic and agricultural</li><li>d. Issues arising from national availability of water resources in the UK, to include drought and flooding</li><li>e. Energy from water, hydroelectric, tidal and wave power — to include the energy changes involved (kinetic to electrical)</li><li>f. Requirements for siting hydroelectric and tidal power stations</li></ul>
<b>4 Biosphere</b> <ul style="list-style-type: none"><li>a. Oceanic and freshwater resources, including economically important species</li><li>b. Terrestrial resources, including economically important species</li><li>c. Energy from biological resources to include definition (biofuels are combustible biomass or fuels derived from biomass). The process of fermentation in formation of biofuels to include conditions required for formation of peat (acidic and anaerobic), and methane as the primary biogas</li></ul>
<b>5 Atmosphere</b> <ul style="list-style-type: none"><li>a. Uses of nitrogen and oxygen</li><li>b. Energy from wind power to include energy changes involved (kinetic to electrical)</li><li>c. Requirements for siting wind farms</li></ul>

Evidence can be drawn from a variety of sources and presented in a variety of formats. The table below describes the evidence for the Assessment Standards which require exemplification. Evidence may be presented for individual Outcomes or gathered for the Unit as a whole, through combining assessment holistically in a single activity. If the latter approach is used, it must be clear how the evidence covers each Outcome.

Assessment Standard	Evidence required
Planning an experiment	The plan should include: an aim a dependent and independent variable key variables to be kept constant measurements/observations to be made the resources the method including safety considerations
Presenting results in an appropriate format	One format from: table, line graph, chart, key, diagram, flow chart, summary or other appropriate format
Drawing a valid conclusion	Include reference to the aim
Evaluating experimental procedures	Suggest an improvement with justification
Making accurate statements	At least half of the statements should be correct across the key areas of this Unit
Solving problems	One from each: make generalisation/prediction select information process information, including calculations, as appropriate analyse information
Outcome 2: making accurate statements and solving problems may be combined into one holistic assessment, with marks allocated to each question. In this case, to achieve Outcome 2 the candidate must achieve at least 50% of the marks available in the set of questions.	

Outcome 1: Candidates must achieve at least five out of the six Assessment Standards to achieve a pass.

### Transfer of Evidence

Evidence for the achievement of Outcome 1 for this Unit can be used as evidence for the achievement of Outcome 1 in the Units H24P 75 *Environmental Science: Living Environment* and H24S 75 *Environmental Science: Sustainability*.

Where Assessment Standard 2.2 is being assessed separately from Assessment Standard 2.1, evidence of achievement of Assessment Standard 2.2 for this Unit can be used as evidence of achievement of Assessment Standard 2.2 in the Units H24P 75 *Environmental Science: Living Environment* and H24S 75 *Environmental Science: Sustainability*.

**Note:** this does not apply when Outcome 2 is being assessed holistically.

As Assessment Standard 2.1 (Making accurate statements) relates specifically to the key areas of each Unit, evidence is **not transferable** between the Units for this Assessment Standard.

Exemplification of assessment is provided in *Unit Assessment Support*.

## Assessment Standard Thresholds

### Outcome 1

Candidates are no longer required to show full mastery of the Assessment Standards to achieve Outcome 1. Instead, five out of the six Assessment Standards for Outcome 1 must be met to achieve a pass.

There is still the requirement for candidates to be given the opportunity to meet all Assessment Standards. The above threshold has been put in place to reduce the volume of re-assessment where that is required.

### Re-assessment

Candidates may be given the opportunity to re-draft their original Outcome 1 report or to carry out a new experiment/practical investigation.

### Outcome 2

#### Assessment Standards 2.1 and 2.2

Assessment Standards 2.1 (making accurate statements) and 2.2 (solving problems) are no longer required to be passed independently. Assessment Standards 2.1 and 2.2 can now be assessed by means of a single assessment for each Unit.

Centres have two possible options when assessing Outcome 2 (AS 2.1 and 2.2).

#### Option 1: Single assessment

Candidates can be assessed by means of a single test that contains marks and a cut-off score. A suitable Unit assessment will cover all of the key areas (AS 2.1) and assess each of the problem solving skills (AS 2.2).

Where a candidate achieves 50% or more of the total marks available in a single Unit assessment they will pass Outcome 2 for that Unit. Existing Unit assessment support packs can be used. Guidance on the use of each pack is noted below.

#### (a) Unit assessment support pack 1 (Unit-by-Unit approach)

As these packages contain questions on all of the key areas (AS 2.1) and questions covering each of the problem solving skills (AS 2.2), Unit assessment support pack 1 is **suitable** for use as a single assessment for its associated Unit.

The number of marks available for each question should be combined to give the total number of marks available. A cut-off score of 50% should be applied to each of these Unit assessments.

The table below gives a total mark for the Unit assessment support pack, using the assessment grid in the packs to allocate marks to questions.

Where a centre is using Unit assessment support pack 1 they should apply the cut-off scores shown in the following table:

Unit assessment support pack 1	Total number of marks available (AS 2.1 + AS 2.2)	Cut-off score
H24R 75 Environmental Science: Earth's Resources	18	9/18

Centres may wish to supplement the existing questions in the Unit assessment support packs with additional questions, so that the sampling of each Unit is increased, the tests are out of the same total mark and that total is an even number so that the cut-off is actually 50%. Where centres are adding additional questions, care should be taken that these questions are of an appropriate standard for Unit assessment and are not 'A grade' type questions.

### (b) Unit assessment support pack 2 (combined approach)

As these packages contain questions covering only Assessment Standard 2.1 they are **not suitable** for use as a single assessment for their associated Units.

If a centre wishes to use Unit assessment support packs 2 as a single Unit assessment, questions covering each of the four problem solving skills would need to be added. A **minimum of 1 mark per problem solving skill per Unit** would be acceptable.

The following table indicates the total number of marks available for the key areas (AS 2.1) in the Unit assessment, using the assessment grid in the Unit assessment support pack to allocate marks to questions.

These marks should be combined with the marks added to assess the problem solving skills (AS 2.2) before the 50% cut-off score is applied.

Unit assessment support pack 2	Total number of marks available (AS 2.1)
H24R 75 Environmental Science: Earth's Resources	23

As with the Unit-by-Unit approach, centres may wish to supplement the existing questions in the Unit assessment support packs with additional questions, so that the sampling of each Unit is increased, the tests are out of the same total mark and that total is an even number so that the cut-off is actually 50%. Where centres are adding additional questions, care should be taken that these questions are of an appropriate standard for Unit assessment and are not 'A grade' type questions.

### Option 2: Assessment

Centres can continue to use the Unit assessment support packs from SQA's secure site or their own centre devised assessments following the guidance in the Unit assessment support packs.

If this option is chosen, 50% or more of the KU statements (AS 2.1) made by candidates must be correct in the Unit assessment and at least one correct response for each problem solving skill (AS 2.2) is required to pass Outcome 2. However, if a candidate is given more than one opportunity in a Unit assessment to provide a response for a problem solving skill, then they must answer 50% or more correctly.

**Re-assessment**

SQA's guidance on re-assessment is that there should be one or, in exceptional circumstances, two re-assessment opportunities. Re-assessment should be carried out under the same conditions as the original assessment. It is at a centre's discretion as to how they re-assess their candidates. Candidates may be given a full re-assessment opportunity, or be re-assessed on individual key areas and/or problem solving skills. Regardless of which KU option is chosen, candidates must achieve 50% or more of each re-assessment opportunity.



# Development of skills for learning, skills for life and skills for work

It is expected that learners will develop broad, generic skills through this Unit. The skills that learners will be expected to improve on and develop through the Unit are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and drawn from the main skills areas listed below. These must be built into the Unit where there are appropriate opportunities.

## **2 Numeracy**

- 2.1 Number processes
- 2.2 Money, time and measurement
- 2.3 Information handling

## **4 Employability, enterprise and citizenship**

- 4.6 Citizenship

## **5 Thinking skills**

- 5.3 Applying
- 5.4 Analysing and evaluating

Amplification of these is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work*. The level of these skills should be at the same SCQF level of the Unit and be consistent with the SCQF level descriptor. Further information on building in skills for learning, skills for life and skills for work is given in the *Unit Support Notes*.

# Administrative information

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**Superclass:** QA

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## History of changes to National Unit Specification

Version	Description of change	Authorised by	Date
2.0	Added table detailing content to be covered. Transfer of evidence updated.	Qualifications Manager	April 2018
2.1	Assessment standard thresholds added	Qualifications Manager	September 2018
3.0	Unit code updated	Qualifications Manager	July 2019

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