

National 3 Environmental Science Course Support Notes



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Please refer to the note of changes at the end of this document for details of changes from previous version (where applicable).

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Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing the National 3 Environmental Science Course. They are intended for teachers and lecturers who are delivering the Course and its Units. They should be read in conjunction with the *Course Specification*, and the *Unit Specifications* for the Units in the Course.

General guidance on the Course

Aims

As stated in the *Course Specification*, the Course aims to enable learners to:

- ◆ develop basic knowledge and understanding of environmental science
- ◆ develop an understanding of environmental science's role in scientific issues and relevant applications of environmental science in society and the environment
- ◆ develop scientific inquiry and investigative skills
- ◆ develop scientific analytical thinking skills in an environmental science context
- ◆ develop the use of technology, equipment and materials, safely, in practical scientific activities
- ◆ develop problem-solving skills in an environmental science context
- ◆ develop practical fieldwork skills in an environmental science context
- ◆ use scientific literacy in everyday contexts
- ◆ establish the foundation for more advanced learning in environmental science

Progression into this Course

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

- ◆ National 2 Science in the Environment Course or relevant component Units

Experiences and outcomes

Learners who have completed Curriculum for Excellence experiences and outcomes will find these an appropriate basis for doing the Course.

In this Course, learners would benefit from having experience of the following:

Organisers	Lines of development	
Planet Earth	Biodiversity and Interdependence	SCN 01, 02, 03
	Energy Sources and Sustainability	SCN 04
	Processes of the Planet	SCN 05
Materials	Earth's Materials	SCN 17
People, Place and the Environment		SOC 8

More detail is contained in the [Environmental Science Progression Framework](#), which shows the development of key areas throughout the suite of Courses.

Progression from this Course

This Course or its components may provide progression for the learner to:

- ◆ National 4 in Environmental Science
- ◆ National 3 or 4 in another science subject or Geography

- ◆ Skills for Work Courses (SCQF levels 3 or 4)
- ◆ National Certificate Group Awards
- ◆ National Progression Awards (SCQF levels 3 or 4)
- ◆ Employment and/or training

Hierarchies

Hierarchy is the term used to describe Courses and Units which form a structured sequence involving two or more SCQF levels.

It is important that any content in a Course and/or Unit at one particular SCQF level is not repeated if a learner progresses to the next level of the hierarchy. The skills and knowledge should be able to be applied to new content and contexts to enrich the learning experience. This is for centres to manage.

- ◆ Environmental Science Courses from National 3 to Higher are hierarchical.
- ◆ Courses from National 3 to Higher have Units with the same structure and titles.

Approaches to learning and teaching

The purpose of this section is to provide you with advice and guidance on learning and teaching for National 3 Environmental Science.

Teaching should involve an appropriate range of approaches to develop knowledge, understanding and skills for learning, life and work. This can be integrated into a related sequence of activities, centred on an idea, theme or application of environmental science, based on appropriate contexts. It need not be restricted to the Unit structure. Learning should be experiential, active, challenging and enjoyable, and should include appropriate practical experiments/activities which can be learner-led. The use of a variety of active learning approaches is encouraged, including peer teaching and assessment, individual and group presentations, role-playing and game-based learning, with learner-generated questions.

When developing your Environmental Science Course there should be opportunities for learners to take responsibility for their learning. Learning and teaching should build on learners' prior knowledge, skills and experiences. The Units and the key areas identified within them may be approached in any appropriate sequence, at the centre's discretion. The distribution of time between the various Units is a matter for professional judgement and is entirely at the discretion the centre. Each Unit is likely to require an approximately equal time allocation, although this may depend on the learners' prior learning in the different key areas.

Learning and teaching, within a class, can be organised in a flexible way, to allow a range of learners' needs to be met, including learners achieving at different levels. The hierarchical nature of the new Environmental Science qualifications provides improved continuity between the levels. Centres can therefore organise learning and teaching strategies in ways appropriate for their learners.

Within a class, there may be learners capable of achieving at a higher level in some aspects of the Course. Where possible, they should be given the opportunity to do so. There may also be learners who are struggling to achieve in all aspects of the Course, and who may only achieve at the lower level in some areas.

Teachers/lecturers need to consider the Course and Unit specifications to identify the differences between Course levels. It may also be useful to refer to the [Environmental Science Progression Framework](#).

When delivering this Course to a group of learners, with some working towards different levels, it may be useful for teachers to identify which activities cover common key areas and skills for all learners, and which additional activities will be required for some learners. In some aspects of the Course, the difference between levels is defined in terms of a higher level of skill.

An investigatory approach is encouraged in the National 3 Environmental Science Course, with learners actively involved in developing their skills,

knowledge and understanding by investigating a range of relevant Environmental Science applications and issues. A holistic approach should be adopted to encourage simultaneous development of learners' conceptual understanding and skills.

Where appropriate, investigative work/experiments should allow learners the opportunity to select activities and/or carry out extended study. Investigative and experimental work is part of the scientific method of working and can fulfil a number of educational purposes.

All learning and teaching should offer opportunities for learners to work collaboratively. Practical activities and investigative work can offer opportunities for group work, which should be encouraged.

Group work approaches can be used within Units and across Courses, where it is helpful to simulate real-life situations, share tasks and promote team working skills. However, there must be clear evidence for each learner to show that the learner has met the required Assessment Standards for the Unit or Course.

Laboratory work should include the use of technology and equipment that reflects current scientific use in Environmental Science. Fieldwork provides an opportunity for practical work, using first-hand experience of an ecosystem to develop knowledge, understanding and problem solving. Appropriate risk assessment must be undertaken.

Learners would be expected to contribute their own time in addition to programmed learning time.

Effective partnership working can enhance the science experience. Where possible, locally relevant contexts should be studied, with visits where this is possible. Guest speakers from eg industry or Further and Higher Education could be used to bring the world of Environmental Science into the classroom.

Information and Communication Technology (ICT) can make a significant contribution to practical work in Environmental Science, in addition to the use of computers as a learning tool. Computer interfacing equipment can detect and record small changes in variables allowing experimental results to be recorded over short periods of time, eg for the duration of a lesson. Results can also be displayed in real time, helping to improve understanding. Data-logging equipment and video cameras can be set up to record data and make observations over periods of time longer than a class lesson which can subsequently be downloaded and viewed for analysis.

Learning about Scotland and Scottish culture will enrich the learners' learning experience and help them to develop the skills for learning, life and work they will need to prepare them for taking their place in a diverse, inclusive and participative Scotland and beyond. Where there are opportunities to contextualise approaches to learning and teaching to Scottish contexts, teachers and lecturers should consider this.

Assessment should be integral to and improve learning and teaching. The approach should involve learners and provide supportive feedback. Self- and peer-assessment techniques should be encouraged wherever appropriate. Assessment information should be used to set learning targets and next steps.

Suggestions for possible contexts and learning activities to support and enrich learning and teaching are detailed in the table below. The **key areas** are from the *Unit Specifications*. **Suggested learning activities** are not mandatory. The table offers examples of suggested activities from which you could select a range. It is not expected that all will be covered. The contexts for key areas are open to personalisation and choice, so centres are likely to devise their own learning activities. **Exemplification of key areas** is not mandatory either. It provides an outline of the level of demand and detail of the key areas.

Living Environment		
Key areas	Suggested learning activities	Exemplification of key areas
1 Sampling and identifying living things, from different habitats, to compare their diversity	<p>Visit different local habitats — field, playground, park, nature reserve etc.</p> <p>Observe and record changes (for instance with a photo diary) of a habitat over a period of time, eg across the seasons.</p> <p>Sample organisms using a variety of methods — observation, pond dipping, pitfall traps, pooters, etc.</p> <p>Identify living things using, for example, pictures or simple branching keys.</p> <p>Count and compare the number of species and organisms identified in contrasting habitats.</p>	
2 Factors influencing the distribution of living things	<p>Investigate ways to enhance biodiversity in local area/school grounds, eg design/set up a bird table, or plant trees/shrubs.</p> <p>Investigate/discuss some factors, eg availability of food/water, nest sites, presence of predators, abiotic factors.</p>	
3 The process of photosynthesis and why plants are vital to sustaining life on Earth	<p>Describe simple photosynthesis word equation using card sort, investigate the process of photosynthesis to make food and oxygen, and investigate the need for CO₂, light and water.</p> <p>Research why plants are vital to sustaining life on Earth. For instance, make a display of plant uses for humans and other animals. (Food, wood for building</p>	

<p>4 The use of different types of chemicals in agriculture and their alternatives</p>	<p>material/fuel/paper, cotton, rubber, oxygen etc.)</p> <p>Grow and eat food, eg cress or bean sprouts.</p> <p>Investigate and construct simple food chains.</p> <p>Research the constituents from a range of chemicals used in agriculture (fertilisers, pesticides etc) for instance by visiting a garden centre and examine labels of packaging materials.</p> <p>Carry out a comparative study by growing plants both with chemicals (artificial fertiliser) and with alternatives to chemicals (eg guano or manure).</p> <p>Carry out 'blind' tasting of organic/conventionally produced fruit and vegetables.</p>	
<p>5 The potential impact of chemicals and their alternatives on the world's food production.</p>	<p>Investigate the potential positive and negative impacts of different types of chemicals and their alternatives. Debate or create a presentation on the issues.</p> <p>Carry out research on growing cereals using IT resources (eg Grain Chain or the education section of the Home Grown Cereals Association (HGCA) website).</p>	

Earth's Resources		
Key areas	Suggested learning activities	Exemplification of key areas
1 Renewable energy sources including benefits and potential problems	<p>Examples of renewable energy sources include hydroelectric, wind, tidal, wave, solar, geothermal and biofuels.</p> <p>Investigate characteristics of sites suitable for renewable power generation, eg hydroelectric power station, wind farm.</p> <p>Visit renewable power generation sites.</p> <p>Design/build a working model of a renewable power generation site.</p> <p>Investigate benefits and potential problems of renewable power generation.</p> <p>Websites Science Online Renewable Energy Resources Alternative Energy Geek Equipment & Renewable resources- UNICEF Renewable Energy World Solar Schools BBC GCSE Bitesize</p>	

<p>2 Formation, characteristics and uses of minerals</p>	<p>Investigate the formation of various minerals.</p> <p>Examine the characteristics of a range of minerals.</p> <p>Investigate the uses of various minerals.</p> <p>Create a report/presentation on a mineral.</p> <p>Websites Geology.com rocksandminerals4u Illinois State Museum Diffen.com British Geological Survey Geological Society</p>	<p>Minerals are elements or compounds.</p>
<p>3 Formation, characteristics and uses of common rocks</p>	<p>Investigate the formation, characteristics and uses of a variety of common rocks, to include igneous, sedimentary and metamorphic.</p> <p>Websites Geology.com rocksandminerals4u British Geological Survey Geological Society USGS BBC GCSE Bitesize</p>	

<p>4 Formation, characteristics and uses of soils</p>	<p>Investigate the formation of soils.</p> <p>Investigate soil characteristics by, for example:</p> <ul style="list-style-type: none"> ◆ viewing soil particles through a microscope ◆ shaking soil in a sealed jar and allowing the particles to settle in order to see the particle size distribution ◆ measuring the pH of a variety of soils ◆ determining the water content in a sample of soil ◆ determining the humus content in a sample of soil ◆ determining the porosity of soil as a percentage of the total volume of the sample ◆ comparing the permeability of sandy and clay soils <p>Dig a trench to study soil horizons, extract animals using eg a Tullgren funnel and construct a wormery.</p> <p>Investigate the uses of soils.</p> <p>Websites Soil-net.com Soils.co.uk USGS Soil Association TES Earth Science Teachers' Association</p>	
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<p>5 Useful substances which can be extracted from natural resources</p>	<p>Investigate/research various substances which are extracted from natural resources for use by humans, eg cellophane, food products which contain extracts of beef or yeast, natural rubber, gum tragacanth, rennin, vegetable oil, natural resin, turpentine, beeswax, antibiotics, iodine, petrol/diesel/kerosene and oxygen/nitrogen.</p> <p>Extract dyes from plants (and use them to dye cloth). Use chromatography to investigate the colouring materials in food/sweets.</p> <p>Websites BBC GCSE Bitesize National Geographic How Stuff Works International Junior Science Olympiad (IJSO)</p>	<p>Natural resources may be of biological or physical (non-biological) origin.</p>
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Sustainability		
Key areas	Suggested learning activities	Exemplification of key areas
<p>1 Processes which may contribute to climate change</p> <p>2 The possible impact of atmospheric change on the survival of living things</p> <p>3 The causes and possible consequences of an environmental issue and ways to manage the impact</p>	<p>This Unit could be tackled through major themes, eg transport, deforestation, industry, agriculture and the depletion of non-renewable resources.</p> <p>Investigate/research processes which contribute to climate change (transport surveys, research media articles etc)</p> <p>Carry out an experiment to show how CO₂ concentration can affect temperature.</p> <p>Investigate/research the causes, impact and ways to manage: sea level rise; Water/air pollution eg acid rain on forests/freshwater; Water shortage/drought/flood; Habitat loss; Waste.</p>	

	<p>Investigate, plan, create and implement a school travel plan. Create an information leaflet.</p> <p>Visit a local quarry, plantation, factory, etc to consider how resources are used and the impact on the environment is reduced.</p> <p>Organise a 'recycled' fashion show.</p> <p>Investigate and create a presentation highlighting benefits of reuse/recycling. Visit a Local Authority recycling centre. Plan, create and maintain a recycling initiative within the school/college/local area.</p> <p>Investigate waste in the local area/household by carrying out a litter survey, interviewing local area wardens.</p> <p>Invite a visiting speaker from the local authority.</p> <p>Plan, create and maintain a small environmental feature, eg a bird feeding station, wildflower bed, plants for bees or a beetle bank.</p> <p>Carry out an audit of energy use (eg at school, home or college). Calculate the carbon footprint of school/college/other.</p> <p>Develop an energy saving idea within the local area. Get involved in/organise local events eg WWF Earth Hour. Create a presentation on the importance of energy saving.</p> <p>Investigate local food production and the impact on the environment of different farming types. Visit a local farm (RHET scheme). Plan a diet based on sustainable food production using local in-season ingredients. Create an allotment in the local area. Plan what will be planted and grown. Create a presentation on its environmental benefits.</p>	
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Developing skills for learning, skills for life and skills for work

Learners are expected to develop broad generic skills as an integral part of their learning experience. The *Course Specification* lists the skills for learning, skills for life and skills for work that learners should develop through this Course. These are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and must be built into the Course where there are appropriate opportunities. The level of these skills will be appropriate to the level of the Course.

For this Course, it is expected that the following skills for learning, skills for life and skills for work will be significantly developed:

Numeracy

This is the ability to use numbers in order to solve problems by counting, doing calculations, measuring, and understanding graphs and charts. This is also the ability to understand the results. Learners will have opportunities to extract process and interpret information presented in numerous formats including tabular and graphical. Practical work will provide opportunities to develop time and measurement skills.

2.1 Number processes

Number processes means solving problems arising in everyday life through carrying out calculations, when dealing with data and results from experiments/investigations and everyday class work, and making informed decisions based on the results of these calculations and understanding these results.

2.2 Money, time and measurement

This means using and understanding time and measurement to solve problems and handle data in a variety of environmental science contexts, including practical and investigative.

2.3 Information handling

Information handling means being able to interpret data in tables, charts, maps and other graphical displays to draw sensible conclusions. It involves interpreting data and considering its reliability in making reasoned deductions and informed decisions. It also involves an awareness and understanding of the chance of events happening.

Employability, enterprise and citizenship

4.6 Citizenship

Citizenship includes: having concern for the environment and for others; being aware of rights and responsibilities; being outward looking towards society; being able to recognise one's personal role in this context; being aware of global issues, understanding one's responsibilities within these and acting responsibly. Learners will develop citizenship skills when considering the applications of Environmental Science on our lives, as well as ethical implications.

Thinking skills

This is the ability to develop the cognitive skills of remembering and identifying, understanding and applying. The Course will allow learners to develop skills of applying, analysing and evaluating. Learners can analyse and evaluate practical work and data by reviewing the process, identifying issues and forming valid conclusions. They can demonstrate understanding and application of key areas and explain and interpret information and data.

5.2 Understanding

This is the ability to demonstrate the meaning of items of environmental science information, to explain the order of events in a sequence, and to interpret in a different setting or context.

5.3 Applying

Applying is the ability to use existing information to solve problems in different contexts, and to plan, organise and complete a task.

In addition, learners will have opportunities to develop skills in literacy, working with others and creating.

Literacy

Learners develop literacy skills to effectively communicate key Environmental Science areas and describe, clearly, Environmental Science issues in written media. Learners will have opportunities to communicate knowledge and understanding of the subject, with an emphasis on applications and environmental, ethical and/or social impacts. Learners will have opportunities to develop listening and reading skills when gathering and processing information.

Working with others

Learning activities provide many opportunities in all areas of the Course for learners to work with others. Practical activities and investigations, in particular, offer opportunities for group work, which is an important aspect of Environmental Science and should be encouraged.

Creating

Through learning in the National 3 Environmental Science Course, learners can demonstrate their creativity. Particularly when planning and designing experiments/investigations, learners have the opportunity to be innovative in their approach. Learners also have the opportunities to make, write, say or do something new.

Approaches to assessment

Assessment should cover the mandatory skills, knowledge and understanding of the Course. Assessment should be integral to and improve learning and teaching. The approach should involve learners and provide supportive feedback. Self- and peer-assessment techniques should be used where appropriate.

See the *Unit Support Notes* for guidance on approaches to assessment of the Units of the Course.

Combining assessment across Units

If an integrated approach to Course delivery is chosen then there may be opportunities for combining assessment across Units. With such an approach it is necessary to be able to track evidence for individual Outcomes and Assessment Standards.

Transfer of evidence

Evidence for the achievement of Outcome 1 and Assessment Standards 2.2, 2.3 and 2.4 for one Unit can be used as evidence of the achievement of Outcome 1 and Assessment Standards 2.2, 2.3 and 2.4 in the other Units of this Course.

Exemplification of standards

Assessment Standards can be achieved via a number of pieces of evidence covering work done on different occasions.

Assessors should record evidence of achievement of Outcomes and Assessment Standards. The table on the next page shows how the evidence has been recorded, with comments, where appropriate. Tables like this are not mandatory.

Candidate 1's report shows the successful achievement of Assessment Standards 1.2 to 1.5, using the template supplied in UASP1. Use of the template is not mandatory.

Although the template provides sections for aim and method, these do not need to be assessed at National 3. They offer assistance to the candidate to develop the skills to produce a scientific report.

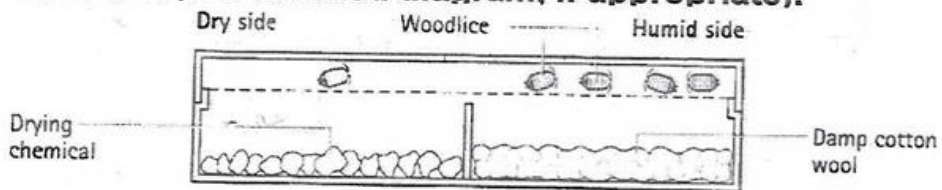
Assessment Standard	Evidence required	Evidence produced
1.1 Following procedures safely	Procedures have been followed safely and correctly	The assessor used a separate checklist to record that they had seen the candidate carry out the procedure.
1.2 Making and recording observations/measurements accurately	Observations/measurements taken are correct	Observations/measurements are presented and these are correct.
1.3 Presenting results in an appropriate format	Results have been presented in an appropriate format	Results are presented in an appropriate format ie table.
1.4 Drawing valid conclusions	What the experiment shows, with reference to the aim	A correct conclusion is stated.
1.5 Evaluating experimental procedures	The suggestion given will improve the experiment	Comments on labelling tubes are an appropriate suggestion for improvement.

Woodlice

AIM:

To find out if woodlice prefer dry or humid conditions.

METHOD (inc. labelled diagram, if appropriate):



- Set up the equipment as shown in the diagram,
- Leave for 30 minutes,
- Count how many woodlice are on each side of the choice chamber.
- Pool results from other groups.

Candidate 1

RESULTS:

result number	number of woodlice on dry side	number of woodlice on wet side
1)	0	5
2)	0	5
3)	0	5
Average	0	5

1.3

CONCLUSIONS:

In conclusion the woodlice prefer to be in humid conditions.

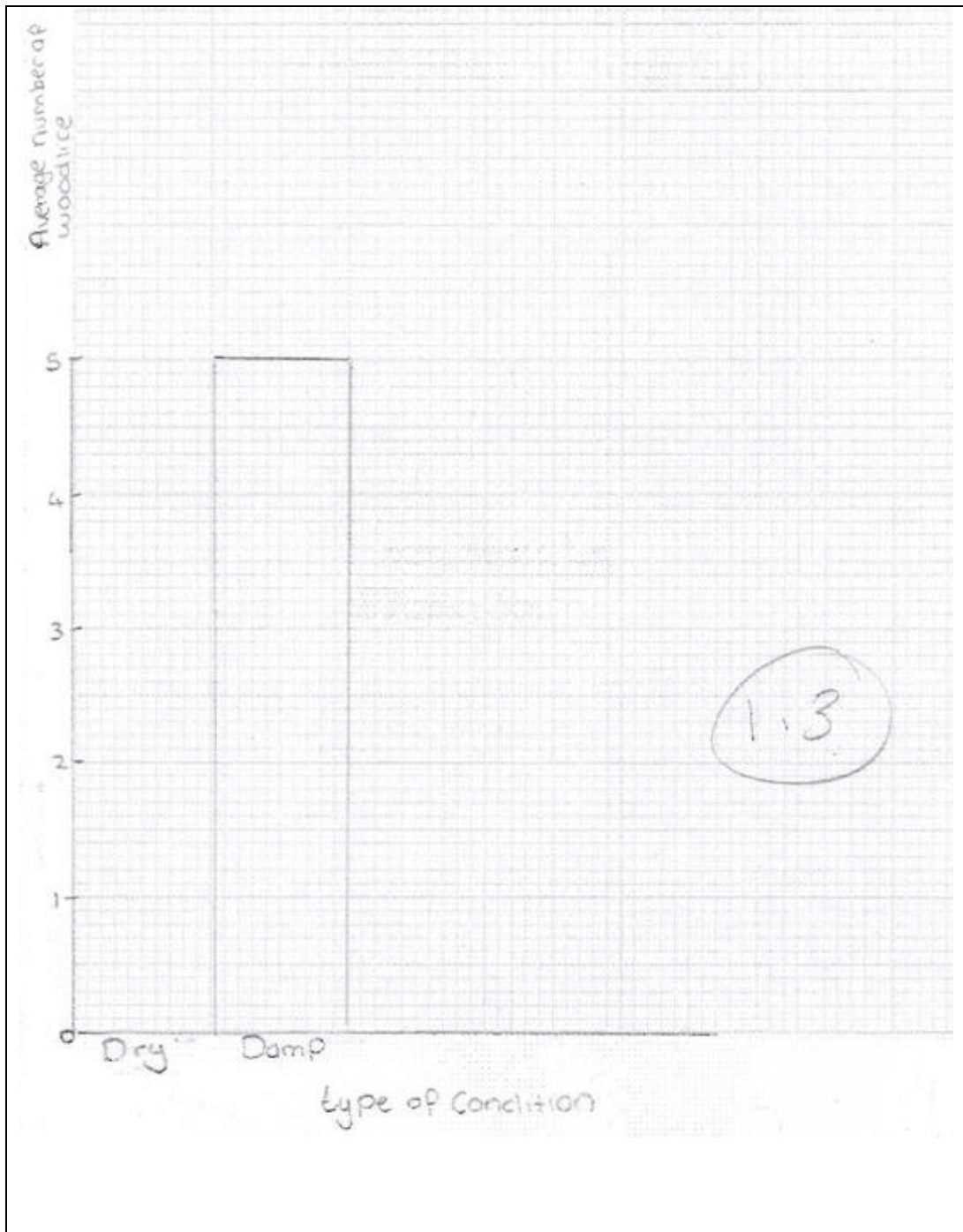
1.4

EVALUATIONS:

I would improve this experiment by using more woodlice.

1.5

Candidate 1



Candidates 2 and 3

The reports from Candidates 2 and 3 cover the same application/issue of environmental science. Their evidence shows how research into the same application/issue has produced individual reports for Assessment Standards 2.2 and 2.3.

Assessment Standard	Evidence required	Evidence produced
2.2 Describing a given application	Appropriate environmental science knowledge used to describe application	Each candidate has used appropriate National 3 Environmental Science knowledge to describe the application. Although the reports are larger than the suggested word count, this is acceptable.
2.3 Describing a given environmental science issue in terms of its effect on the environment/society	Appropriate environmental science knowledge is used to describe its effect	Each candidate has used appropriate National 3 Environmental Science knowledge to describe the effect. Effects on both the environment and society are described. It is not required that both are given.

The Use of Fertilisers

- Help Plants grow
- Increase yield
- Nitrogen Fertilizers
- Manure
- Help get more food for the world to eat
- Improve plant yield
- ~~It~~ Suffocates water living organisms
- Contaminate wells

Fertilisers are used to help plant grow taller to get richer produce. This means that the entire population has ~~a~~ food to consume and farmers make more money. Examples of fertilisers are manure, nitrogen fertiliser and other fertilisers. The advantages of fertilisers are that people who do not have enough food to eat get more as there is an improve plant yield. Disadvantages of fertilisers are that it suffocates water living organisms from algal bloom and it contaminates wells.

Candidate 3

Use of Fertilizers

Fertilizers are use of helping plants grow and increase the amount of crops you grow and harvested. There are some different types of fertilizers. They are manure and chemical. Fertilizers have a lot of advantages and some disadvantages. The advantages are they help to grow crops and that will make more food. The disadvantages are that the Fertiliser can run of and go into ponds and cause algea blooms and that will kid the animals and plants in the pond. So this shows Fertilizers are good for something.

Equality and inclusion

The following should be taken into consideration:

Situation	Reasonable adjustment
Carrying out practical activities	Use could be made of practical helpers for learners with: <ul style="list-style-type: none"> ◆ physical disabilities, especially manual dexterity, when carrying out practical activities ◆ visual impairment who have difficulty distinguishing colour changes or other visual information
Reading, writing and presenting text, symbolic representation, tables, graphs, maps and diagrams	Use could be made of ICT, enlarged text, alternative paper and/or print colour and/or practical helpers for learners with visual impairment, specific learning difficulties and physical disabilities
Process information using calculations	Use could be made of practical helpers for learners with specific cognitive difficulties (eg dyscalculia)
Draw a valid conclusion, giving explanations and making generalisation/predictions	Use could be made of practical helpers for learners with specific cognitive difficulties or autism

As far as possible, reasonable adjustments should be made for the assignment, where necessary. This includes the use of 'practical helpers', readers, scribes, adapted equipment or assistive technologies.

It is recognised that centres have their own duties under equality and other legislation and policy initiatives. The guidance given in these *Course Support Notes* is designed to sit alongside these duties but is specific to the delivery and assessment of the Course.

It is important that centres are aware of and understand SQA's assessment arrangements for disabled learners and those with additional support needs when making requests for adjustments to published assessment arrangements. Centres will find more guidance on this in the series of publications on assessment arrangements on SQA's website: www.sqa.org.uk/sqa//14977.html.

Appendix 1: Reference documents

The following reference documents will provide useful information and background.

- ◆ Assessment Arrangements (for disabled candidates and/or those with additional support needs) — various publications are available on SQA's website at: www.sqa.org.uk/sqa/14977.html.
- ◆ [*Building the Curriculum 4: Skills for learning, skills for life and skills for work*](#)
- ◆ [*Building the Curriculum 5: A framework for assessment*](#)
- ◆ [*Course Specifications*](#)
- ◆ [*Design Principles for National Courses*](#)
- ◆ [*Guide to Assessment \(June 2008\)*](#)
- ◆ [*Overview of Qualification Reports*](#)
- ◆ Principles and practice papers for curriculum areas
- ◆ [*SCQF Handbook: User Guide*](#) (published 2009) and SCQF level descriptors (to be reviewed during 2011 to 2012): www.sqa.org.uk/sqa/4595.html
- ◆ [*SQA Skills Framework: Skills for Learning, Skills for Life and Skills for Work*](#)
- ◆ [*Skills for Learning, Skills for Life and Skills for Work: Using the Curriculum Tool*](#)

Administrative information

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History of changes to Course Support Notes

Course details	Version	Description of change	Authorised by	Date

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Note: You are advised to check SQA's website (www.sqa.org.uk) to ensure you are using the most up-to-date version.

Unit Support Notes — Environmental Science: Living Environment (National 3)



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Please refer to the note of changes at the end of this document for details of changes from previous version (where applicable).

Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing the *Environmental Science: Living Environment* (National 3) Unit. They are intended for teachers and lecturers who are delivering this Unit. They should be read in conjunction with:

- ◆ the *Unit Specification*
- ◆ the *Course Specification*
- ◆ the *Course Support Notes*
- ◆ appropriate assessment support materials

General guidance on the Unit

Aims

The general aim of this Unit is to develop skills of scientific inquiry, investigation and analytical thinking, along with knowledge and understanding of the living environment. Learners will apply these skills when considering the applications of this Unit 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: sampling and identifying living things from different habitats, to compare their diversity; factors influencing the distribution of living things; the process of photosynthesis and why plants are vital to sustaining life on Earth; the use of different types of chemicals in agriculture and their alternatives; and the potential impact of chemicals and their alternatives on the world's food production. Learners will research issues, apply scientific skills and communicate information related to their findings, which will develop scientific literacy.

Progression into this Unit

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 the following or equivalent qualifications and/or experience:

- ◆ National 2 Science in the Environment Course or relevant component Units

Skills, knowledge and understanding covered in this Unit

Information about skills, knowledge and understanding is given in the National 3 Environmental Science *Course Support Notes*.

If this Unit is being delivered on a free-standing basis, teachers and lecturers are free to select the skills, knowledge, understanding and contexts which are most appropriate for delivery in their centres.

Progression from this Unit

This Unit may provide progression to:

- ◆ other qualifications in Environmental Science or related areas
- ◆ further study, employment and/or training

Approaches to learning and teaching

Approaches to learning and teaching and suggested learning activities are covered in the *Course Support Notes*.

Developing skills for learning, skills for life and skills for work

Information about developing skills for learning, skills for life and skills for work in this Unit, is given in the *Course Support Notes*.

Approaches to assessment and gathering evidence

The purpose of this section is to give advice on approaches to assessment for the Unit. There will be other documents produced for centres to provide exemplification of assessments and guidance on how to write them.

Approaches to the assessment of a Unit when it forms part of a Course may differ from approaches to assessing the same Unit when it is not being delivered as part of a Course. If an integrated approach to Course delivery is chosen, then there may be opportunities for combining assessment across Units.

Assessments must be valid, reliable and fit for purpose for the subject and level, and should fit in with learning and teaching approaches.

Unit assessment should support learning and teaching and, where possible, enable personalisation and choice for learners in assessment methods and processes. Teachers and lecturers should select the assessment methods they believe are most appropriate, taking into account the needs of their learners and the requirements of the Unit.

There is no mandatory order for delivery of the Outcomes. These should be overtaken throughout the Unit and are an integral part of learning and teaching.

The table below gives guidance and advice on possible approaches to assessment and gathering evidence:

Strategies for gathering evidence
<p>There may be opportunities in the day-to-day delivery of the Units in a Course to observe learners providing evidence which satisfies completely, or partially, a Unit or Units. This is naturally occurring evidence and can be recorded as evidence for the Units or parts of Units. In some cases, additional evidence may also be required to supplement and confirm the naturally occurring evidence.</p> <p>Approaches to assessment might cover the whole Unit or be combined across Outcomes. A holistic approach can enrich the assessment process for the learner by bringing together different Outcomes and/or Assessment Standards.</p>

If a holistic approach is used, then it is necessary to be able to track individual Assessment Standard evidence.

Strategies for gathering evidence and ensuring that the learners' work is their own could include:

- ◆ personal interviews during which the teacher or lecturer can ask additional questions about completed work
- ◆ an oral presentation on their work
- ◆ writing reports in supervised conditions
- ◆ checklists to record the authenticity
- ◆ supplementary sources of evidence, such as witness testimony, film or audio clips

Evidence can be gathered from classwork, experiments, investigations and/or research carried out in this Unit. It can be obtained using one or more of the strategies outlined above or by alternative methods, which could include a test of knowledge, understanding and skills.

Equality and inclusion

The *Course Support Notes* provide full information on equality and inclusion for this Unit.

It is recognised that centres have their own duties under equality and other legislation and policy initiatives. The guidance given in these *Unit Support Notes* is designed to sit alongside these duties but is specific to the delivery and assessment of the Unit.

Alternative approaches to Unit assessment to take account of the specific needs of learners can be used. However, the centre must be satisfied that the integrity of the assessment is maintained and that any alternative approaches to assessment will, in fact, generate the necessary evidence of achievement.

Appendix 1: Reference documents

The following reference documents will provide useful information and background.

- ◆ Assessment Arrangements (for disabled learners and/or those with additional support needs) — various publications on SQA’s website:
<http://www.sqa.org.uk/sqa/14976.html>
- ◆ [*Building the Curriculum 3: A framework for learning and teaching*](#)
- ◆ [*Building the Curriculum 4: Skills for learning, skills for life and skills for work*](#)
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- ◆ *Research Report 4 — Less is More: Good Practice in Reducing Assessment Time*
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- ◆ [*SCQF Handbook: User Guide \(published 2009\)*](#) and
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- ◆ SQA Guidelines on e-assessment for Schools
- ◆ SQA Guidelines on Online Assessment for Further Education
- ◆ SQA e-assessment web page: www.sqa.org.uk/sqa/5606.html

Administrative information

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History of changes to Unit Support Notes

Unit details	Version	Description of change	Authorised by	Date

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Unit Support Notes — Environmental Science: Earth's Resources (National 3)



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Please refer to the note of changes at the end of this document for details of changes from previous version (where applicable).

Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing the *Environmental Science: Earth's Resources* (National 3) Unit. They are intended for teachers and lecturers who are delivering this Unit. They should be read in conjunction with:

- ◆ the *Unit Specification*
- ◆ the *Course Specification*
- ◆ the *Course Support Notes*
- ◆ appropriate assessment support materials

General guidance on the Unit

Aims

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 this Unit 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: renewable energy sources including benefits and potential problems; formation, characteristics and uses of minerals; formation, characteristics and uses of common rocks; formation, characteristics and uses of soils; and useful substances which can be extracted from natural resources.

Learners will research issues, apply scientific skills and communicate information related to their findings, which will develop scientific literacy.

Progression into this Unit

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 the following or equivalent qualifications and/or experience:

- ◆ National 2 Science in the Environment Course or relevant component Units

Skills, knowledge and understanding covered in this Unit

Information about skills, knowledge and understanding is given in the National 3 Environmental Science *Course Support Notes*.

If this Unit is being delivered on a free-standing basis, teachers and lecturers are free to select the skills, knowledge, understanding and contexts which are most appropriate for delivery in their centres.

Progression from this Unit

This Unit may provide progression to:

- ◆ other qualifications in Environmental Science or related areas
- ◆ further study, employment and/or training

Approaches to learning and teaching

Approaches to learning and teaching and suggested learning activities are covered in the *Course Support Notes*.

Developing skills for learning, skills for life and skills for work

Information about developing skills for learning, skills for life and skills for work in this Unit is given in the *Course Support Notes*.

Approaches to assessment and gathering evidence

The purpose of this section is to give advice on approaches to assessment for the Unit. There will be other documents produced for centres to provide exemplification of assessments and guidance on how to write them.

Approaches to the assessment of a Unit when it forms part of a Course may differ from approaches to assessing the same Unit when it is not being delivered as part of a Course. If an integrated approach to Course delivery is chosen, then there may be opportunities for combining assessment across Units.

Assessments must be valid, reliable and fit for purpose for the subject and level, and should fit in with learning and teaching approaches.

Unit assessment should support learning and teaching and, where possible, enable personalisation and choice for learners in assessment methods and processes. Teachers and lecturers should select the assessment methods they believe are most appropriate, taking into account the needs of their learners and the requirements of the Unit.

There is no mandatory order for delivery of the Outcomes. These should be overtaken throughout the Unit and are an integral part of learning and teaching.

The table below gives guidance and advice on possible approaches to assessment and gathering evidence:

Strategies for gathering evidence
<p>There may be opportunities in the day-to-day delivery of the Units in a Course to observe learners providing evidence which satisfies completely, or partially, a Unit or Units. This is naturally occurring evidence and can be recorded as evidence for the Units or parts of Units. In some cases, additional evidence may also be required to supplement and confirm the naturally occurring evidence.</p> <p>Approaches to assessment might cover the whole Unit or be combined across Outcomes. A holistic approach can enrich the assessment process for the learner by bringing together different Outcomes and/or Assessment Standards.</p>

If a holistic approach is used, then it is necessary to be able to track individual Assessment Standard evidence.

Strategies for gathering evidence and ensuring that the learners' work is their own could include:

- ◆ personal interviews during which the teacher or lecturer can ask additional questions about completed work
- ◆ an oral presentation on their work
- ◆ writing reports in supervised conditions
- ◆ checklists to record the authenticity
- ◆ supplementary sources of evidence, such as witness testimony, film or audio clips

Evidence can be gathered from classwork, experiments, investigations and/or research carried out in this Unit. It can be obtained using one or more of the strategies outlined above or by alternative methods, which could include a test of knowledge, understanding and skills.

Equality and inclusion

The *Course Support Notes* provide full information on equality and inclusion for this Unit.

It is recognised that centres have their own duties under equality and other legislation and policy initiatives. The guidance given in these *Unit Support Notes* is designed to sit alongside these duties but is specific to the delivery and assessment of the Unit.

Alternative approaches to Unit assessment to take account of the specific needs of learners can be used. However, the centre must be satisfied that the integrity of the assessment is maintained and that any alternative approaches to assessment will, in fact, generate the necessary evidence of achievement.

Appendix 1: Reference documents

The following reference documents will provide useful information and background.

- ◆ Assessment Arrangements (for disabled learners and/or those with additional support needs) — various publications on SQA’s website:
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Administrative information

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History of changes to Unit Support Notes

Unit details	Version	Description of change	Authorised by	Date

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Unit Support Notes — Environmental Science: Sustainability (National 3)



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Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing the *Environmental Science: Sustainability* (National 3) Unit. They are intended for teachers and lecturers who are delivering this Unit. They should be read in conjunction with:

- ◆ the *Unit Specification*
- ◆ the *Course Specification*
- ◆ the *Course Support Notes*
- ◆ appropriate assessment support materials

General guidance on the Unit

Aims

The general aim of this Unit is to develop skills of scientific inquiry, investigation and analytical thinking, along with knowledge and understanding of sustainability. Learners will apply these skills when considering the applications of this Unit 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: the processes which may contribute to climate change; the possible impact of atmospheric change on the survival of living things; the causes and possible consequences of an environmental issue, and ways to manage the impact. Learners will research issues, apply scientific skills and communicate information related to their findings, which will develop scientific literacy.

Progression into this Unit

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 the following or equivalent qualifications and/or experience:

- ◆ National 2 Science in the Environment Course or relevant component Units

Skills, knowledge and understanding covered in this Unit

Information about skills, knowledge and understanding is given in the National 3 Environmental Science *Course Support Notes*.

If this Unit is being delivered on a free-standing basis, teachers and lecturers should cover the mandatory skills and key areas in ways that are most appropriate for delivery in their centres.

Progression from this Unit

This Unit may provide progression to:

- ◆ other qualifications in Environmental Science or related areas
- ◆ further study, employment and/or training

Approaches to learning and teaching

Approaches to learning and teaching and suggested learning activities are covered in the *Course Support Notes*.

Developing skills for learning, skills for life and skills for work

Information about developing skills for learning, skills for life and skills for work in this Unit, is given in the *Course Support Notes*.

Approaches to assessment and gathering evidence

The purpose of this section is to give advice on approaches to assessment for the Unit. There will be other documents produced for centres to provide exemplification of assessments and guidance on how to write them.

Approaches to the assessment of a Unit when it forms part of a Course may differ from approaches to assessing the same Unit when it is not being delivered as part of a Course. If an integrated approach to Course delivery is chosen, then there may be opportunities for combining assessment across Units.

Assessments must be valid, reliable and fit for purpose for the subject and level, and should fit in with learning and teaching approaches.

Unit assessment should support learning and teaching and, where possible, enable personalisation and choice for learners in assessment methods and processes. Teachers and lecturers should select the assessment methods they believe are most appropriate, taking into account the needs of their learners and the requirements of the Unit.

There is no mandatory order for delivery of the Outcomes. These should be overtaken throughout the Unit and are an integral part of learning and teaching.

The table below gives guidance and advice on possible approaches to assessment and gathering evidence.

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Evidence can be gathered from classwork, experiments, investigations and/or research carried out in this Unit. It can be obtained using one or more of the strategies outlined above or by alternative methods, which could include a test of knowledge, understanding and skills.

Equality and inclusion

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History of changes to Unit Support Notes

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