

SCIENCE
Access 2

Fourth edition – published September 2003

**NOTE OF CHANGES TO ACCESS 2 ARRANGEMENTS
FOURTH EDITION - PUBLISHED SEPTEMBER 2003**

CLUSTER TITLE: Science (Access 2)

CLUSTER NUMBER: C081 08

National Cluster Specification

No change

National Unit Specification:

All units - Reduction in assessment

National Cluster

SCIENCE (ACCESS 2)

CLUSTER NUMBER C081 08

STRUCTURE

The cluster comprises any **three** of the following units:

<i>D04A 08</i>	<i>Biology (Acc 2)</i>	<i>1 credit (40 hours)</i>
<i>D03Y 08</i>	<i>Chemistry (Acc 2)</i>	<i>1 credit (40 hours)</i>
<i>D04P 08</i>	<i>Physics (Acc 2)</i>	<i>1 credit (40 hours)</i>
<i>D04B 08</i>	<i>Science (Acc 2)</i>	<i>1 credit (40 hours)</i>

In common with all courses, this programme of study includes 40 hours over and above the 120 hours for the component units. This is for induction, extending the range of learning and teaching approaches, support, consolidation 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.

CORE SKILLS

This cluster gives automatic certification of the following:

Complete core skills for the cluster	Problem Solving	Acc 2
Additional core skills components for the cluster	None	

Administrative Information

Publication date:	September 2003
Source:	Scottish Qualifications Authority
Version:	04

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National Cluster: general information (cont)

CLUSTER Science (Access 2)

RATIONALE

This cluster has been designed to offer candidates opportunities to study science at an appropriate level so as to develop an understanding of some of its basic principles and techniques. This is done by emphasising and promoting a practical and problem-solving approach, together with an understanding of relevant applications of science in society. Within the three units selected, candidates will be working in a range of contexts, and units have been designed to allow teachers/lecturers as much flexibility as possible in choice of suitable content. This approach will ensure that the units can be offered in as wide a range of centres as possible, but will also ensure that candidates experience a broad range of aspects of science.

Coherence is provided by ensuring that in each unit, the basic experiences of practical problem solving and handling information are addressed.

It is hoped that attitudes such as being open-minded, inquisitive and willing to recognise alternative points of view will be encouraged by the proposed approach, and that basic skills can be encouraged and developed as part of a cross-curricular approach. Skills and abilities developed through practical activities and information handling should support learning as a whole. It is also hoped that candidates' abilities to sustain effort and concentration, come to conclusions, make decisions, complete a process and evaluate their work are developed.

ASSESSMENT

Access differs from courses at other levels in that there is no external assessment.

For successful completion of a unit candidates are required to be involved in:

- three experiments made up of one from each of three different contexts
- three activities, each drawn from a different context, involving handling information from a provided source

For successful completion of the cluster, candidates are required to be involved in:

- nine experiments drawn from nine different contexts
- nine activities, drawn from nine different contexts, involving handling information from a provided source

It should be noted that no specific activity can be used more than once for assessment purposes. For example, if a particular biology experiment is selected for candidates taking the unit *D04B 08 Science* for assessment purposes, then the same experiment could not be used at a later date for assessment purposes by the same candidate taking the unit *D04A 08 Biology*.

National Cluster: general information (cont)

CLUSTER Science (Access 2)

APPROACHES TO LEARNING AND TEACHING

As indicated above, a practical investigative approach should be taken to learning and teaching. Such an approach provides opportunities to develop individual and group activities using a variety of resources. Some further advice is given in the Support Notes for the units.

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 Arrangements* (SQA, 2001).

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	Biology (Access 2)
NUMBER	D04A 08
CLUSTER	Science (Access 2)

SUMMARY

This unit offers the opportunity to explore, in a biological context, some practical applications of science, to carry out a range of practical activities and to develop skills of handling information from a number of different sources.

OUTCOMES

- 1 Carry out practical experiments.
- 2 Handle information from a provided source.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Access 2.

Administrative Information

Superclass:	RH
Publication date:	September 2003
Source:	Scottish Qualifications Authority
Version:	04

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National Unit Specification: general information (cont)

UNIT Biology (Access 2)

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	Problem Solving	Acc 2
Additional core skills components for the unit	None	

National Unit Specification: statement of standards

UNIT Biology (Access 2)

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.

The contexts for this unit are:

The Living Body

Plants

The Environment

Healthy Bodies

The Animal Kingdom

Detergents

OUTCOME 1

Carry out practical experiments.

Performance criteria

- (a) A realistic plan is prepared.
- (b) Participation in the experiment is active.
- (c) The procedures are followed safely and according to the plan.
- (d) Relevant measurements or observations are recorded in an appropriate format.
- (e) The experiment is reviewed and evaluated.

Evidence requirements

PC (a) The plan should include:

- aim and main features of the experiment
- outline of three to five simple steps
- familiar equipment and materials selected for the experiment

PCs (b) and (c) Evidence of safe and active participation in the planned experiment may be recorded using an observation checklist.

PCs (d) and (e) A record of the results/observations and a statement about the strengths or weaknesses of the experiment. At least two points should be identified by the candidate.

Evidence may be verbal or non-verbal and may include one or more of the following: speech, writing, signing, lip-reading, Braille, word-processing, computer-assisted communication.

Candidates are required to be involved in three experiments made up of one from each of three different contexts.

National Unit Specification: statement of standards (cont)

UNIT **Biology (Access 2)**

OUTCOME 2

Handle information from a provided source.

Performance criteria

- (a) Relevant information is selected and presented.
- (b) Conclusions drawn are valid and explanations given are supported by evidence.

Evidence requirements

Evidence for PCs (a) and (b) must be generated from three sources of information, each related to a different context. The sources of information could be from speakers, video, papers, posters, books etc.

This evidence may be verbal, non-verbal, and may include lip reading, Braille, word processing and computer assisted communication.

National Unit Specification: support notes

UNIT **Biology (Access 2)**

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.

Prior Learning

The unit specifications describe the activities which candidates have to undertake to produce evidence of achievement. However all these activities, whether experimental or in relation to information handling, require prior learning and teaching in order to provide the necessary background knowledge and skills.

Teachers/lecturers should give candidates the opportunity to practise all the skills necessary before assessment, in order for the candidates to have the best chance of being successful in demonstrating the performance criteria for the relevant outcomes.

Time Allocation

While the notional design length of this unit is 40 hours, the actual time spent on covering the unit is at the discretion of the centre.

Safety

Particular attention should be paid to safe working practices. Time should also be spent ensuring that the candidate is familiar with any apparatus he/she has not used before.

ASSESSMENT

In order to fulfil criteria for assessment, successful candidate responses are only required on one occasion. Assessment should only be carried out when the teacher/lecturer feels that the candidate has a reasonable chance of success.

Experiments selected for Outcome 1 are likely to involve some kind of investigative activity. Sources of information for Outcome 2 should be straightforward and allow candidates to select and present information and draw some kind of simple conclusion.

The National Assessment Bank material for this unit provides examples of assessment instruments together with exemplar candidate responses to indicate the level of demand at Access 2.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

The table below gives an illustration, for each of the specified contexts, of the kind of topics which could be considered. It also provides some suggested activities both for Outcome 1 (experimental activities) and for Outcome 2 (handling information). However, individual centres are free to choose any of the specified contexts and to identify other topics and activities within the chosen contexts.

National Unit Specification: support notes (cont)

UNIT Biology (Access 2)

Context	Topics	Experiments/Activities
The Living Body	The heart and circulatory system	<p>Outcome 1</p> <ul style="list-style-type: none"> Investigate the effect of exercise on pulse rate Find out whether different parts of the body give equally good and reliable pulse rate readings <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about the main parts of the human heart and what they do Find out about major causes of heart damage Find out about the main constituents of the blood Find out about the main differences between veins and arteries
	The lungs and breathing	<p>Outcome 1</p> <ul style="list-style-type: none"> Investigate the effect of exercise on the rate of breathing Compare the carbon dioxide content of expired and un-expired air Investigate the change in chest circumference when breathing in and out Measure lung capacities of group members and compare with their weight/height <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about diseases which affect the lungs such as asthma and bronchitis
	Food and digestion	<p>Outcome 1</p> <ul style="list-style-type: none"> Investigate a range of foods for the presence of starch and sugar Investigate a range of foods for the presence of protein Investigate the changes which take place when bread is chewed for a while <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about the protein content of different foods from labels and other sources Find out why proteins are important

National Unit Specification: support notes (cont)

UNIT Biology (Access 2)

Context	Topics	Experiments/Activities
The Environment	Water pollution	<p>Outcome 1</p> <ul style="list-style-type: none"> Examine water samples for quantity and variety of life from polluted and non-polluted environments Test acidity of water at different points in a stream to find out if it is always the same <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about the different kinds of substances which can pollute water Find out the harmful effects of substances which pollute water Identify a selection of pond invertebrates from a key (or use the BBC disc 'Pondlife')
	Litter and the environment	<p>Outcome 1</p> <ul style="list-style-type: none"> Plan and carry out an audit of litter in a social area e.g. school playground Plan and carry out an investigation into whether anti-litter messages on products are effective Plan and carry out an investigation into whether the amount of litter dropped is affected by the number of bins available <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about the % of different kinds of litter collected locally and nationally Find out about some of the dangers caused by careless disposal of litter
	Conserving the environment	<p>Outcome 1</p> <ul style="list-style-type: none"> Plan and carry out a small-scale environmental quality assessment for your local area Plan and carry out a small scale recycling project e.g. aluminium cans, waste paper Investigate which environmental conditions are preferred by woodlice <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about materials which can be recycled Find out about biodegradable substances Find out how natural habitats for some species of animal are being damaged

National Unit Specification: support notes (cont)

UNIT Biology (Access 2)

Context	Topics	Experiments/Activities
<p>The Animal Kingdom</p>	<p>Classification</p>	<p>Outcome 2</p> <ul style="list-style-type: none"> • Find out about the difference between vertebrates and invertebrates • Find out about vertebrate groups – birds, mammals, fish, reptiles and amphibians • Find out how to decide which group an animal belongs to
	<p>Environment</p>	<p>Outcome 1</p> <ul style="list-style-type: none"> • Use a choice chamber (a box with four apartments i.e. wet and dark/ wet and light/ dry and dark/ dry and light), drop in some woodlice and find out which environment they prefer • Investigate your environment (e.g. school playground) and find out what kind of creatures live there <p>Outcome 2</p> <ul style="list-style-type: none"> • Find out what all animals need from their environment in order to survive (oxygen, food, water, the temperature which suits them best) • Find out how some animals adapt to survive in their environment
	<p>Food chains</p>	
<p>Science: Unit Specification</p>	<p>Biology (Acc 2)</p>	<p>14</p>

	<p>Outcome 1</p> <ul style="list-style-type: none"> • Investigate a simple food chain in action - make a 'Planet in a Bottle' using brine shrimps, algae, and sand in salty water • Investigate the role of decomposers by making a wormery. Use layers of sand and soil in order to track the worms' movements <p>Outcome 2</p> <ul style="list-style-type: none"> • Find out about simple food chains (plant → consumer → predator) • Find out about decomposers (e.g. woodlice, worms, minibeasts in a compost heap or in leaf litter) and how important a role they play
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National Unit Specification: support notes (cont)

UNIT Biology (Access 2)

Context	Topics	Experiments/Activities
Detergents	Removing dirt	<p>Outcome 1</p> <ul style="list-style-type: none"> Investigate the effect of detergent on the surface tension of water. Look at water droplets with/without detergent in them. Add detergent to water which has an object (e.g. paperclip) sitting on its surface Investigate the effectiveness of water with and without detergent on removing soot from cloth. Run water with/without detergent through sooty cloth and see the difference in the water which comes through <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about different types of detergent and what they are used for (e.g. soap, washing up liquid, washing powder)
	Biological detergents	<p>Outcome 1</p> <ul style="list-style-type: none"> Compare the effects of biological and non-biological detergents on a variety of stains <p>Outcome 2</p> <ul style="list-style-type: none"> Find out how biological detergents work and the advantages and disadvantages of using them
	Effect on the environment	<p>Outcome 1</p> <ul style="list-style-type: none"> Investigate the effect of small quantities of detergent on the growth of algae (e.g. green pond scum or algae from a pet shop which sell fish) <p>Outcome 2</p> <ul style="list-style-type: none"> Find out what happens to detergents after we have used them, and what effect they have on the environment

National Unit Specification: support notes (cont)

UNIT Biology (Access 2)

Context	Topics	Experiments/Activities
Healthy Bodies	Healthy Lifestyle	<p>Outcome 1</p> <ul style="list-style-type: none"> • Investigate distribution of body fat by measuring fat under skin of various parts of the body (e.g. skull, fingers, lower arm using skin callipers) • Investigate connections between height and weight by measuring the height and weight of a small group of people <p>Outcome 2</p> <ul style="list-style-type: none"> • Examine own teeth or models of human teeth and those of a grazing animal (e.g. rabbit) and flesh eating animal (e.g. dog), to show our teeth are designed for eating a variety of food • Find out about healthy lifestyles by collecting information from magazines, health promotion pamphlets on the need for exercise, rest, leisure and avoiding smoking, alcohol, drugs and solvent abuse
	Healthy Eating	<p>Outcome 1</p> <ul style="list-style-type: none"> • Test foods for fat (e.g. milk, butter, instant meals, snacks, nuts, raw fruit and vegetables using filter paper) • Investigate the water content of food by weighing the amount of water taken up by dehydrated food (e.g. dried fruit, dehydrated potato, rice) <p>Outcome 2</p> <ul style="list-style-type: none"> • Find out what is meant by a balanced diet and why our bodies need vitamins, fat, carbohydrates, protein and water • Find out what happens to food on its journey through the digestive system

National Unit Specification: support notes (cont)

UNIT Biology (Access 2)

Context	Topics	Experiments/Activities
Healthy Bodies (cont)	Healthy Bones and Muscles	<p>Outcome 1</p> <ul style="list-style-type: none"> • Investigate the strength of bones using paper tubes. Show, using weights, that they can withstand more force along the length than from the side • Investigate muscle fatigue using finger muscles to repeatedly stretch an elastic band – find out how the number of repetitions per 20 seconds changes as the time of exercise increases <p>Outcome 2</p> <ul style="list-style-type: none"> • Find out about the skeleton and its function (i.e. protection, support, movement) • Find out how muscles and bones work together when we move • Find out about the three aspects of fitness (strength, suppleness, stamina) and why it is important to keep fit
	Silent Invaders	<p>Outcome 2</p> <ul style="list-style-type: none"> • Find out about the use of antibiotics to destroy harmful bacteria • Find out about Alexander Fleming and his work • Find out about recent concerns about overuse of antibiotics leading to superbugs (e.g. drug resistant bacteria) • Find out about antifungal chemicals used to limit fungal growth (e.g. athlete's foot and thrush) and how to treat infection • Find out about the different kinds of milk on the market, for example difference in fat content and different ways of stopping milk going sour • Find out about Louis Pasteur and his work

National Unit Specification: support notes (cont)

UNIT Biology (Access 2)

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 Arrangements* (SQA, 2001).

National Unit Specification: general information

UNIT Chemistry (Access 2)

NUMBER D03Y 08

CLUSTER Science (Access 2)

SUMMARY

This unit offers the opportunity to explore, in the context of chemistry, some practical applications of science, to carry out a range of practical activities and to develop skills of handling information from a number of different sources.

OUTCOMES

- 1 Carry out practical experiments.
- 2 Handle information from a provided source.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Access 2.

Administrative Information

Superclass: RD

Publication date: September 2003

Source: Scottish Qualifications Authority

Version: 04

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National Unit Specification: general information (cont)

UNIT Chemistry (Access 2)

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	Problem Solving	Acc 2
Additional core skills components for the unit	None	

National Unit Specification: statement of standards

UNIT Chemistry (Access 2)

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.

The contexts for this unit are:

Fuels

Drugs

Matter/Substances

Metals

Clothing, Fibres and Dyes

Acids and Alkalis

OUTCOME 1

Carry out practical experiments.

Performance criteria

- A realistic plan is prepared.
- Participation in the experiment is active.
- The procedures are followed safely and according to the plan.
- Relevant measurements or observations are recorded in an appropriate format.
- The experiment is reviewed and evaluated.

Evidence requirements

PC (a) The plan should include:

- aim and main features of the experiment
- outline of three to five simple steps
- familiar equipment and materials selected for the experiment

PCs (b) and (c) Evidence of safe and active participation in the planned experiment may be recorded using an observation checklist.

PCs (d) and (e) A record of the results/observations and a statement about the strengths or weaknesses of the experiment. At least two points should be identified by the candidate.

Evidence may be verbal or non-verbal and may include one or more of the following: speech, writing, signing, lip-reading, Braille, word-processing, computer-assisted communication.

Candidates are required to be involved in three experiments made up of one from each of three different contexts.

National Unit Specification: statement of standards (cont)

UNIT Chemistry (Access 2)

OUTCOME 2

Handle information from a provided source.

Performance criteria

- (a) Relevant information is selected and presented.
- (b) Conclusions drawn are valid and explanations given are supported by evidence.

Evidence requirements

Evidence for PCs (a) and (b) must be generated from three sources of information, each related to a different context. The sources of information could be from speakers, video, papers, posters, books etc.

This evidence may be verbal, non-verbal, and may include lip reading, Braille, word processing and computer assisted communication.

National Unit Specification: support notes

UNIT **Chemistry (Access 2)**

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.

Prior Learning

The unit specifications describe the activities which candidates have to undertake to produce evidence of achievement. However all these activities, whether experimental or in relation to information handling, require prior learning and teaching in order to provide the necessary background knowledge and skills.

Teachers/lecturers should give candidates the opportunity to practise all the skills necessary before assessment, in order for the candidates to have the best chance of being successful in demonstrating the performance criteria for the relevant outcomes.

Time Allocation

While the notional design length of this unit is 40 hours, the actual time spent on covering the unit is at the discretion of the centre.

Safety

Particular attention should be paid to safe working practices. Time should also be spent ensuring that the candidate is familiar with any apparatus he/she has not used before.

ASSESSMENT

In order to fulfil criteria for assessment, successful candidate responses are only required on one occasion. Assessment should only be carried out when the teacher/lecturer feels that the candidate has a reasonable chance of success.

Experiments selected for Outcome 1 are likely to involve some kind of investigative activity. Sources of information for Outcome 2 should be straightforward and allow candidates to select and present information and draw some kind of simple conclusion.

The National Assessment Bank material for this unit provides examples of assessment instruments together with exemplar candidate responses to indicate the level of demand at Access 2.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

The table below gives an illustration, for each of the specified contexts, of the kind of topics which could be considered. It also provides some suggested activities both for Outcome 1 (experimental activities) and for Outcome 2 (handling information). However, individual centres are free to choose any of the specified contexts and to identify other topics and activities within the chosen contexts.

National Unit Specification: support notes (cont)

UNIT Chemistry (Access 2)

Context	Topics	Experiments/Activities
Fuels	Fire and fire safety	<p>Outcome 1</p> <ul style="list-style-type: none"> Investigate the effect of oxygen starvation on a flame – vary size of beaker and measure time for flame to extinguish Test a variety of flameproof and non-flameproof materials <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about how to deal with different kinds of fires in the lab and at home – information from fire extinguishers, talk from Fire Service, leaflets, video etc
	Food as fuel	<p>Outcome 1</p> <ul style="list-style-type: none"> Burn different food types, e.g. peanuts, sugar and investigate heat produced Investigate the products of burning such foods <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about the carbohydrate, fat and energy provided by different foods using labels as a source of information Find out about the use of high energy foods by e.g. athletes, explorers
	Sources of fuels	<p>Outcome 2</p> <ul style="list-style-type: none"> Find out where fuels come from – information on gas, coal and other sources including Scottish Power videos e.g. Energy For Life, Power Station visit Find out how coal was formed Find out about how recycling saves fuel, think about community refuse, visit recycling plant Find out about alternative uses of waste materials

National Unit Specification: support notes (cont)

UNIT Chemistry (Access 2)

Context	Topics	Experiments/Activities
Drugs	Alcohol	Outcome 2 <ul style="list-style-type: none">Find out the effect of alcohol on the body including the long-term effectsFind out about units for each drink, % volume of alcohol (labels)Find out about the link between road accidents and alcohol
	Smoking	Outcome 1 <ul style="list-style-type: none">Measure tar content of cigarettesInvestigate lung capacity Outcome 2 <ul style="list-style-type: none">Find and use information from packets, QUIT Society and other sourcesFind out about illness of smokers and non-smokers
	Other Drugs	Outcome 2 <ul style="list-style-type: none">Find out about the effect of other drugs from leaflets, speakers, news reports

National Unit Specification: support notes (cont)

UNIT Chemistry (Access 2)

Context	Topics	Experiments/Activities
Matter/Substances	Solids, Liquids and Gases	<p>Outcome 1</p> <ul style="list-style-type: none"> Find the temperature of melting ice and investigate the effect of adding salt Find the temperature of boiling water and investigate the effect of adding salt Investigate how to speed up/slow down evaporation Investigate the melting points of different solids <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about the water cycle in nature Find out about the use of anti-freeze Find out about the melting and boiling points of different substances
	Solutions	<p>Outcome 1</p> <ul style="list-style-type: none"> Test which substances are soluble from a list e.g. sugar, salt, chalk, instant coffee Investigate the effect of heating on speed of dissolving Investigate the effect of stirring/crushing on speed of dissolving Investigate mixing of liquids – e.g. syrup and water, oil and water
	Mixing and separating substances	<p>Outcome 1</p> <ul style="list-style-type: none"> Mix sand and water, and investigate the effectiveness of using different types of filters to separate them Mix and separate salt and water, copper sulphate and water <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about water purification Find out what an oil filter is for and how it works
	Chemical hazards	<p>Outcome 2</p> <ul style="list-style-type: none"> Find out about dangers of chemicals from labels and other sources – in the lab, in the home, on lorries

National Unit Specification: support notes (cont)

UNIT Chemistry (Access 2)

Context	Topics	Experiments/Activities
Metals	Causes of corrosion	Outcome 1 <ul style="list-style-type: none">Carry out test-tube experiments to show that water and air are needed for rustingInvestigate the effect of acid rain and salt on the rusting processUse rust indicator to show what parts of a nail rust firstPlan and carry out a survey to find the extent of corrosion in a particular areaInvestigate some metals to find one which does not rust easily
	Prevention of corrosion	Outcome 1 <ul style="list-style-type: none">Investigate ways of slowing down or stopping rusting Outcome 2 <ul style="list-style-type: none">Find out how cars are protected from rustingFind out about the use of materials which do not rust
	Sources of metals	Outcome 2 <ul style="list-style-type: none">Find out the names of some metals which are found uncombined in the earthFind out how early gold-miners managed to get some gold from the earth

National Unit Specification: support notes (cont)

UNIT Chemistry (Access 2)

Context	Topics	Experiments/Activities
Clothes, Fibres and Dyes	Clothes	<p>Outcome 1</p> <ul style="list-style-type: none"> Compare the properties of a natural and a man-made fabric. Test wear resistance (rub with sandpaper block), wind resistance (blow air through material with a hairdryer and see if a piece of paper on the other side blows about), insulating properties <p>Outcome 2</p> <ul style="list-style-type: none"> Find out why particular materials are chosen to make particular types of clothing (e.g. clothing suitable for Scottish mountains in winter) Think about unusual materials which could be used to make clothing (e.g. aluminium cans flattened to make a skirt)
	Fibres	<p>Outcome 1</p> <ul style="list-style-type: none"> Compare the strength of different types of fibre by hanging weights on to threads until they break <p>Outcome 2</p> <ul style="list-style-type: none"> Find out how wool, silk, cotton and man-made fibres are produced
	Dyes	<p>Outcome 1</p> <ul style="list-style-type: none"> Make dye (e.g. using whins, brambles, onion skins, beetroot, coffee). Compare the colour fastness of this dye with that of a mineral dye Investigate the ease with which different fabrics can be dyed (e.g. nylon is not very absorbent and so it does not dye well) <p>Outcome 2</p> <ul style="list-style-type: none"> Find out if there is a link between colours of dye, and the type of material clothes are made from (e.g. camouflage material, khaki)

National Unit Specification: support notes (cont)

UNIT Chemistry (Access 2)

Context	Topics	Experiments/Activities
Acids and Alkalis	Common acids and alkalis	Outcome 1 <ul style="list-style-type: none">Use litmus paper and/or natural indicator (e.g. red cabbage) to test a range of common household acids and alkalis Outcome 2 <ul style="list-style-type: none">Find out about common acids and alkalis and their uses
	Neutralisation	Outcome 1 <ul style="list-style-type: none">Neutralise weak acid solutions with indigestion remedies or toothpaste – test with litmus Outcome 2 <ul style="list-style-type: none">Find out about common neutralisation reactions
	Acid rain	Outcome 1 <ul style="list-style-type: none">Investigate the effect of weak acid on plant growth by watering some cress plants with water and other cress plants with weak acidInvestigate the effect of weak acid on limestone or chalk powder Outcome 2 <ul style="list-style-type: none">Find out what causes acid rain, and how we can reduce its effects

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 Arrangements* (SQA, 2001).

National Unit Specification: general information

UNIT	Physics (Access 2)
NUMBER	D04P 08
CLUSTER	Science (Access 2)

SUMMARY

This unit offers the opportunity to explore, in the context of physics, some practical applications of science, to carry out a range of practical activities and to develop skills of handling information from a number of different sources.

OUTCOMES

- 1 Carry out practical experiments.
- 2 Handle information from a provided source.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Access 2.

Administrative Information

Superclass:	RC
Publication date:	September 2003
Source:	Scottish Qualifications Authority
Version:	04

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National Unit Specification: general information (cont)

UNIT Physics (Access 2)

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	Problem Solving	Acc 2
Additional core skills components for the unit	None	

National Unit Specification: statement of standards

UNIT Physics (Access 2)

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.

The contexts for this unit are:

Energy

Forces

Electricity

Magnetism

Light, Colour and Sound

Earth and Space

OUTCOME 1

Carry out practical experiments.

Performance criteria

- (a) A realistic plan is prepared.
- (b) Participation in the experiment is active.
- (c) The procedures are followed safely and according to the plan.
- (d) Relevant measurements or observations are recorded in an appropriate format.
- (e) The experiment is reviewed and evaluated.

Evidence requirements

PC (a) The plan should include:

- aim and main features of the experiment
- outline of three to five simple steps
- familiar equipment and materials selected for the experiment

PCs (b) and (c) Evidence of safe and active participation in the planned experiment may be recorded using an observation checklist.

PC (d) and (e) A record of the results/observations and a statement about the strengths or weaknesses of the experiment. At least two points should be identified by the candidate.

Evidence may be verbal or non-verbal and may include one or more of the following: speech, writing, signing, lip-reading, Braille, word-processing, computer assisted communication.

Candidates are required to be involved in three experiments made up of one from each of three different contexts.

National Unit Specification: statement of standards (cont)

UNIT Physics (Access 2)

OUTCOME 2

Handle information from a provided source.

Performance criteria

- (a) Relevant information is selected and presented.
- (b) Conclusions drawn are valid and explanations given are supported by evidence.

Evidence requirements

Evidence for PCs (a) and (b) must be generated from three sources of information, each related to a different context. The sources of information could be from speakers, video, papers, posters, books etc.

This evidence may be verbal, non-verbal, and may include lip reading, Braille, word processing and computer assisted communication.

National Unit Specification: support notes

UNIT Physics (Access 2)

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.

Prior Learning

The unit specifications describe the activities which candidates have to undertake to produce evidence of achievement. However all these activities, whether experimental or in relation to information handling, require prior learning and teaching in order to provide the necessary background knowledge and skills.

Teachers/lecturers should give candidates the opportunity to practise all the skills necessary before assessment, in order for the candidates to have the best chance of being successful in demonstrating the performance criteria for the relevant outcomes.

Time Allocation

While the notional design length of this unit is 40 hours, the actual time spent on covering the unit is at the discretion of the centre.

Safety

Particular attention should be paid to safe working practices. Time should also be spent ensuring that the candidate is familiar with any apparatus he/she has not used before.

ASSESSMENT

In order to fulfil criteria for assessment, successful candidate responses are only required on one occasion. Assessment should only be carried out when the teacher/lecturer feels that the candidate has a reasonable chance of success.

Experiments selected for Outcome 1 are likely to involve some kind of investigative activity. Sources of information for Outcome 2 should be straightforward and allow candidates to select and present information and draw some kind of simple conclusion.

The National Assessment Bank material for this unit provides examples of assessment instruments together with exemplar candidate responses to indicate the level of demand at Access 2.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

The table below gives an illustration, for each of the specified contexts, of the kind of topics which could be considered. It also provides some suggested activities both for Outcome 1 (experimental activities) and for Outcome 2 (handling information). However, individual centres are free to choose any of the specified contexts and to identify other topics and activities within the chosen contexts.

National Unit Specification: support notes (cont)

UNIT Physics (Access 2)

Energy (cont)	Heat energy	<p>Outcome 1</p> <ul style="list-style-type: none">• Investigate the effect of heat energy on solids e.g. bi-metallic strip; metal ball and holder• Investigate effect of heat energy on liquids – boiling/evaporation rates for different liquids• Investigate effect of heat on gases – make a hot air balloon, using kit• Test the thermal conductivity of different metals• Test materials for best insulator <p>Outcome 2</p> <ul style="list-style-type: none">• Find out about some different ways of saving heat loss from houses• Find out about % energy saved by using different forms of house insulation• Find out about the different cooking times needed for a range of foods by examining information from food packages
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National Unit Specification: support notes (cont)

UNIT Physics (Access 2)

Context	Topics	Experiments/Activities
Forces	Push and pull	Outcome 1 <ul style="list-style-type: none"> • Investigate the use of pulleys with different weights • Test different thread strengths • Investigate the stretching of elastic bands of different thickness • Investigate the best shape for a parachute Outcome 2 <ul style="list-style-type: none"> • Find out about the force of gravity on different planets and in space
	Floating and sinking	Outcome 1 <ul style="list-style-type: none"> • Test a selection of different liquids for buoyancy • Test which materials float and sink in water • Design and make a Plasticine ® shape which will float Outcome 2 <ul style="list-style-type: none"> • Find out which insects are able to walk on water and why
	Friction	Outcome 1 <ul style="list-style-type: none"> • Test the speed of movement of toy car on different surfaces • Test the speed of movement of toy car on different slopes Outcome 2 <ul style="list-style-type: none"> • Examine information about stopping distances of cars

National Unit Specification: support notes (cont)

UNIT Physics (Access 2)

Context	Topics	Experiments/Activities
Electricity	Static electricity	<p>Outcome 1</p> <ul style="list-style-type: none"> • Test materials for static – e.g. ability to pick up pieces of paper after rubbing • Test different materials for producing static by rubbing plastic • Investigate which materials retain static charge over time <p>Outcome 2</p> <ul style="list-style-type: none"> • Find out about an example of naturally occurring static electricity e.g. lightning • Find out about uses of static electricity e.g. in photocopiers, air cleaners
	Batteries	<p>Outcome 1</p> <ul style="list-style-type: none"> • Make a battery and investigate using different materials <p>Outcome 2</p> <ul style="list-style-type: none"> • Find out about advantages and disadvantages of re-chargeable batteries • Examine a range of different batteries and find out what might influence the size of the voltage
	Simple circuits	<p>Outcome 1</p> <ul style="list-style-type: none"> • Build a simple circuit which includes a bulb, a meter and a battery and: • test the effect of including more than one bulb or • test the effect of including different types of bulb or • test different materials to see if they conduct • Design and build a hoop and wire game
	Safety	<p>Outcome 2</p> <ul style="list-style-type: none"> • Find out about dangers related to electricity in the home and identify dangerous situations from illustrations • Find out why some circuits include a fuse

National Unit Specification: support notes (cont)

UNIT Physics (Access 2)

Context	Topics	Experiments/Activities
Light, Colour and Sound	Light	<p>Outcome 1</p> <ul style="list-style-type: none"> Investigate refraction of light through water/glass/Perspex using various shapes of block (e.g. cube, pyramid) Investigate the effect of converging and diverging lenses on parallel rays of light <p>Outcome 2</p> <ul style="list-style-type: none"> Find out how we see the world around us – reflection of light from objects, function of parts of the eye (e.g. lens, retina)
	Colour	<p>Outcome 1</p> <ul style="list-style-type: none"> Investigate the splitting of white light into a spectrum using a prism and a light source (e.g. a ray box or torch) Investigate colour mixing using a light source and colour filters <p>Outcome 2</p> <ul style="list-style-type: none"> Find out how rainbows are produced Find out about colour blindness
	Sound	<p>Outcome 1</p> <ul style="list-style-type: none"> Look at the effect of sound waves on soap film or stretched cling film (movement of soap film, or sand or rice on cling film) Investigate pitch and the length of vibrating string or column of air (e.g. by using a home-made guitar) <p>Outcome 2</p> <ul style="list-style-type: none"> Find out how we hear – sound as vibration, function of parts of the ear (e.g. sound causes ear drum to vibrate)

National Unit Specification: support notes (cont)

UNIT Physics (Access 2)

Context	Topics	Experiments/Activities
Magnetism	Magnets and their magnetic fields	<p>Outcome 1</p> <ul style="list-style-type: none"> • Investigate the attraction of unlike poles and repulsion of like poles using 2 magnets • Using iron filings, investigate the magnetic field around a bar magnet, (e.g. a pair of magnets with poles placed North to North and a pair of magnets with poles placed North to South) <p>Outcome 2</p> <ul style="list-style-type: none"> • Find out about the materials used to make magnets (e.g. iron, nickel) and the materials they attract
	Earth's magnetic field and the compass	<p>Outcome 1</p> <ul style="list-style-type: none"> • Make a floating compass with a needle and cork. Investigate the direction it points with a magnet present and without a magnet present <p>Outcome 2</p> <ul style="list-style-type: none"> • Find out about the Earth's magnetic field, and the use of the compass
	Electromagnetism	<p>Outcome 1</p> <ul style="list-style-type: none"> • Make an electromagnet by coiling wire around an iron nail and connecting it to an electric circuit. Investigate the effect that number of turns in the coil, size of current flowing, and the presence of an iron core (with or without nail) have on its strength (e.g. ability to pick up paper clips) <p>Outcome 2</p> <ul style="list-style-type: none"> • Find out about the uses of electromagnets in everyday life (doorbell, loudspeaker, TV)

National Unit Specification: support notes (cont)

UNIT Physics (Access 2)

Context	Topics	Experiments/Activities
Earth and Space	Earth, sun and moon	<p>Outcome 1</p> <ul style="list-style-type: none"> Investigate the factors affecting the size and shape of craters on the moon (e.g. drop different size marbles into a tray of sand) <p>Outcome 2</p> <ul style="list-style-type: none"> Find out why we get day and night, the year and seasons Find out about the phases of the moon throughout its cycle Find out how eclipses happen
	Planets and stars	<p>Outcome 1</p> <ul style="list-style-type: none"> Make a telescope using two convex lenses (focal lengths of lenses 5 cms and 25 cms, lenses placed 25 cms apart) and compare the image seen with the original object <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about the planets in our solar system, stars and constellations Find out what stars are and about the length of time it takes for light from stars to travel to Earth
	Gravity	<p>Outcome 1</p> <ul style="list-style-type: none"> Drop different weights of similar shape from a height and investigate the rate at which they fall <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about gravity and the movement of planets, moons and satellites

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 Arrangements* (SQA, 2001).

National Unit Specification: general information

UNIT	Science (Access 2)
NUMBER	D04B 08
CLUSTER	Science (Access 2)

SUMMARY

This unit offers the opportunity to explore some practical applications of science, to carry out a range of practical activities and to develop skills of handling information from a number of different sources.

OUTCOMES

- 1 Carry out practical experiments.
- 2 Handle information from a provided source.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Access 2.

Administrative Information

Superclass:	RA
Publication date:	September 2003
Source:	Scottish Qualifications Authority
Version:	04

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National Unit Specification: general information (cont)

UNIT Science (Access 2)

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	Problem Solving	Acc 2
Additional core skills components for the unit	None	

National Unit Specification: statement of standards

UNIT Science (Access 2)

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.

The contexts for this unit are made up of all the contexts listed in the Biology, Chemistry and Physics units at Access 2:

Biology	Chemistry	Physics
The Living Body Plants The Environment Healthy Bodies The Animal Kingdom Detergents	Fuels Drugs Matter/Substances Metals Clothing, Fibres and Dyes Acids and Alkalis	Energy Forces Electricity Magnetism Light, Colour and Sound Earth and Space

OUTCOME 1

Carry out practical experiments.

Performance criteria

- A realistic plan is prepared.
- Participation in the experiment is active.
- The procedures are followed safely and according to the plan.
- Relevant measurements or observations are recorded in an appropriate format.
- The experiment is reviewed and evaluated.

Evidence requirements

PC (a) The plan should include:

- aim and main features of the experiment
- outline of three to five simple steps
- familiar equipment and materials selected for the experiment

PCs (b) and (c) Evidence of safe and active participation in the planned experiment may be recorded using an observation checklist.

PCs (d) and (e) A record of the results/observations and a statement about the strengths or weaknesses of the experiment. At least two points should be identified by the candidate.

Evidence may be verbal or non-verbal and may include one or more of the following: speech, writing, signing, lip-reading, Braille, word-processing, computer assisted communication.

Candidates are required to be involved in three experiments made up of one from each of three different contexts. One of these contexts should be from Biology, one from Chemistry and one from Physics.

National Unit Specification: statement of standards (cont)

UNIT Science (Access 2)

OUTCOME 2

Handle information from a provided source.

Performance criteria

- (a) Relevant information is selected and presented.
- (b) Conclusions drawn are valid and explanations given are supported by evidence.

Evidence requirements

Evidence for PCs (a) and (b) must be generated from three sources of information, each related to a different context. One of these contexts should be from Biology, one from Chemistry and one from Physics. The sources of information could be from speakers, video, papers, posters, books etc.

This evidence may be verbal, non-verbal, and may include lip reading, Braille, word processing and computer assisted communication.

National Unit Specification: support notes

UNIT Science (Access 2)

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.

Prior Learning

The unit specifications describe the activities which candidates have to undertake to produce evidence of achievement. However all these activities, whether experimental or in relation to information handling, require prior learning and teaching in order to provide the necessary background knowledge and skills.

Teachers/lecturers should give candidates the opportunity to practise all the skills necessary before assessment, in order for the candidates to have the best chance of being successful in demonstrating the performance criteria for the relevant outcomes.

Time Allocation

While the notional design length of this unit is 40 hours, the actual time spent on covering the unit is at the discretion of the centre.

Safety

Particular attention should be paid to safe working practices. Time should also be spent ensuring that the candidate is familiar with any apparatus he/she has not used before.

ASSESSMENT

In order to fulfil criteria for assessment, successful candidate responses are only required on one occasion. Assessment should only be carried out when the teacher/lecturer feels that the candidate has a reasonable chance of success.

Experiments selected for Outcome 1 are likely to involve some kind of investigative activity. Sources of information for Outcome 2 should be straightforward and allow candidates to select and present information and draw some kind of simple conclusion.

The National Assessment Bank material for this unit provides examples of assessment instruments together with exemplar candidate responses to indicate the level of demand at Access 2.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

The table below gives an illustration, for three of the specified contexts, of the kind of topics which could be considered. One of the contexts is from Biology, one from Chemistry and one from Physics. The individual unit specifications for Biology, Chemistry and Physics have additional exemplification for the specified contexts. The table also provides some suggested activities both for Outcome 1 (experimental activities) and for Outcome 2 (handling information). However, individual centres are free to choose any of the specified contexts and to identify other topics and activities within the chosen contexts, as long as one is from Biology, one from Chemistry and one from Physics.

National Unit Specification: support notes (cont)

UNIT Science (Access 2)

Context (Biology)	Topics	Experiments/Activities
Plants	Variety of plants	<p>Outcome 1</p> <ul style="list-style-type: none"> • Test green and variegated leaves for the presence of starch • Test acidity of soil in a coniferous and a deciduous forest • Plan and carry out a survey of the different plants growing in a small area <p>Outcome 2</p> <ul style="list-style-type: none"> • Identify plants from leaf shape using a key • Identify plants using a flower key • Find out about uses of plants and their products e.g. for dyes, medicines and oils
	Seed biology	<p>Outcome 1</p> <ul style="list-style-type: none"> • Investigate the best conditions for seed germination e.g. heat, light, moisture • Design and carry out an investigation into which kind of wind-dispersed seed travels the furthest when dropped from the same height <p>Outcome 2</p> <ul style="list-style-type: none"> • Find out about the main parts of a seed and their purpose
	Plant development	<p>Outcome 1</p> <ul style="list-style-type: none"> • Investigate the best solutions/media for growth of pollen tubes • Investigate how the direction of light affects plant growth <p>Outcome 2</p> <ul style="list-style-type: none"> • Find out about the different parts of a plant • Find out about the life cycle of a plant
	Plant growth	<p>Outcome 1</p> <ul style="list-style-type: none"> • Investigate the effect on growth of different conditions – air, water, temperature, soil, drainage <p>Outcome 2</p> <ul style="list-style-type: none"> • Find out from plant care instructions, the best conditions for growth for two

		or three different species of plants
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National Unit Specification: support notes (cont)

UNIT Science (Access 2)

Context (Chemistry)	Topics	Experiments/Activities
Fuels	Fire and fire safety	<p>Outcome 1</p> <ul style="list-style-type: none"> Investigate the effect of oxygen starvation on a flame – vary size of beaker and measure time for flame to extinguish Test a variety of flameproof and non-flameproof materials <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about how to deal with different kinds of fires in the lab and at home – information from fire extinguishers, talk from Fire Service, leaflets, video etc
	Food as fuel	<p>Outcome 1</p> <ul style="list-style-type: none"> Burn different food types, e.g. peanuts, sugar and investigate heat produced Investigate the products of burning such foods <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about the carbohydrate, fat and energy provided by different foods using labels as a source of information Find out about the use of high energy foods by e.g. athletes, explorers
	Source of fuels	<p>Outcome 2</p> <ul style="list-style-type: none"> Find out where fuels come from – information on gas, coal and other sources including Scottish Power videos e.g. Energy For Life, Power Station visit Find out how coal was formed Find out about how recycling saves fuel; think about community refuse; visit recycling plant Find out about alternative uses of waste materials

National Unit Specification: support notes (cont)

UNIT Science (Access 2)

Context (Physics)	Topics	Experiments/Activities
Forces	Push and pull	<p>Outcome 1</p> <ul style="list-style-type: none"> Investigate the use of pulleys with different weights Test different thread strengths Investigate the stretching of elastic bands of different thickness Investigate the best shape for a parachute <p>Outcome 2</p> <ul style="list-style-type: none"> Find out about the force of gravity on different planets and in space
	Floating and sinking	<p>Outcome 1</p> <ul style="list-style-type: none"> Test a selection of different liquids for buoyancy Test which materials float and sink in water Design and make a Plasticine ® shape which will float <p>Outcome 2</p> <ul style="list-style-type: none"> Find out which insects are able to walk on water and why
	Friction	<p>Outcome 1</p> <ul style="list-style-type: none"> Test the speed of movement of toy car on different surfaces Test the speed of movement of toy car on different slopes <p>Outcome 2</p> <ul style="list-style-type: none"> Examine information about stopping distances of cars

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 Arrangements* (SQA, 2001).