SCOTTISH QUALIFICATIONS AUTHORITY

PHYSICS
Intermediate 1

Fourth edition – published June 2002

SCOTTISH QUALIFICATIONS AUTHORITY

NOTE OF CHANGES TO ARRANGEMENTS FOURTH EDITION PUBLISHED JUNE 2002

COURSE TITLE: Physics (Intermediate 1)

COURSE NUMBER: C069 10

National Course Specification

Course Details:

Content areas	minor change of title	5.3
Content statements	statement split	2.3.8 (old) → 2.3.8, 2.3.9
	subsequent renumbering of statements in area 2.3	
	minor change	1.5.2, 1.5.7, 2.1.8, 4.1.8, 4.1.9, 5.1.4, 5.1.7, 5.1.9, 5.3.4, 6.1.11
	new statements	5.1.10, 5.1.11, 5.1.12
	statement deleted	6.1.4
	statement renumbered	6.1.5 (old) → 6.1.4
	new statement	6.1.5
Support Materials	text modified	

National Unit Specification:

D373 10 Telecommunications

General information	Outcome 3 modified
Statement of standards	Outcome 3, associated Performance criteria and Evidence requirements modified
Support notes	advice regarding Outcome 3 modified

D374 10 Practical Electricity

General information	Outcome 3 modified
Statement of standards	Outcome 3 and associated Evidence requirements modified
Support notes	advice regarding Outcome 3 modified

D375 10 Radiations

General information	Outcome 3 modified
Statement of standards	Outcome 3, associated Performance criteria and Evidence requirements modified
Support notes	advice regarding Outcome 3 modified

NOTE OF CHANGES TO ARRANGEMENTS (cont)

COURSE TITLE:	Physics (Intermediate 1)
COURSE NUMBER:	C069 10

D376 10 Sound and Music

General information	Outcome 3 modified
Statement of standards	Outcome 3 and associated Evidence requirements modified
Support notes	advice regarding Outcome 3 modified

D377 10 Movement

General information	Outcome 3 modified
Statement of standards	minor modification of title of one Content area specified in Evidence requirements of Outcome 1 and Outcome 2 Outcome 3 and associated Evidence requirement modified
Support notes	advice regarding Outcome 3 modified

D378 10 Electronics

General information	Outcome 3 modified
Statement of standards	Outcome 3 and associated Evidence requirements modified
Support notes	advice regarding Outcome 3 modified

SCOTTISH QUALIFICATIONS AUTHORITY

National Course Specification: general information

PHYSICS (INTERMEDIATE 1)

COURSE NUMBER C069 10

COURSE STRUCTURE

The course has six mandatory units, as follows.

D373 10	***Telecommunications (Int 1)***	***0.5 credit (20 hours)***
D374 10	***Practical Electricity (Int 1)***	***0.5 credit (20 hours)***
D375 10	***Radiations (Int 1)***	***0.5 credit (20 hours)***
D376 10	***Sound and Music (Int 1)***	***0.5 credit (20 hours)***
D377 10	***Movement (Int 1)***	***0.5 credit (20 hours)***
D378 10	***Electronics (Int 1)***	***0.5 credit (20 hours)***

This course includes 40 hours over and above the 120 hours for the component units. This may be used for induction, extending the range of learning and teaching approaches, support, consolidation, integration of learning and preparation for external assessment.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates will normally be expected to have attained the following.

- Standard Grade Physics at grade 5, 6 or 7

or

- Standard Grade Biology, Chemistry or Science at grade 4, 5, 6 or 7

or

- appropriate Access units

Administrative Information

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 04

National Course Specification: general information (cont)

COURSE Physics (Intermediate 1)

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Course Specification: course details

COURSE Physics (Intermediate 1)

RATIONALE

This course has been designed to meet the needs of candidates who wish to pursue the study of physics in contexts which relate to their vocational and leisure aspirations.

Within this course:

- practical skills are developed
- relevant practical applications of physics principles are emphasised
- contexts are modern, relevant and useful
- basic physics concepts are developed where they are essential for the understanding of the application
- mathematical work is kept to a minimum.

Development of relevant knowledge and understanding, problem solving and practical activities form the basis of the Intermediate 1 Physics course.

As a result of following an Intermediate 1 Physics course, candidates should acquire:

- an increased knowledge and understanding of facts and ideas, of techniques, and of applications of physics in society
- skill in applying their knowledge and understanding in a variety of problem solving contexts
- skills associated with carrying out experimental and investigative work in physics and analysing the information obtained.

Positive attitudes, such as being open-minded and willing to recognise alternative points of view, are promoted.

Entry to the Intermediate 1 Physics course will be from a variety of scientific backgrounds, including progression from Standard Grade Science. The Intermediate 1 Physics course is designed to articulate with the knowledge and skills developed in Standard Grade Science. It will take candidates into areas where physics has shaped, and continues to shape, our changing physical environment. The course endeavours to provide learning experiences leading to the acquisition of worthwhile knowledge, skills and attitudes, which will assist candidates in making their own reasoned decisions on many issues within a modern society increasingly dependent on science and technology. The course will also provide those who wish to proceed beyond Intermediate 1 Physics with a suitable basis for further study.

COURSE CONTENT

The course is made up of six mandatory units: Telecommunications, Practical Electricity, Radiations, Sound and Music, Movement, and Electronics. While these units are valuable in their own right, candidates will gain considerable additional benefit from completing this course, since there will be opportunities for the integration of skills developed through study of the units, and for tackling problem solving of a less structured nature than that required for attainment of the performance criteria of the units. Evidence of achievement of the problem solving core skill will be provided by end of unit assessments, reports on practical work and the external examination. The following Content Statements describe in detail what the candidate should be able to do in order to demonstrate the knowledge and understanding associated with the course. External assessment will sample from across all of the Content Statements.

National Course Specification: course details (cont)

Intermediate 1 Physics: Telecommunications

The Content Statements given in the left-hand column of the table below describe in detail what the candidate should be able to do in demonstrating knowledge and understanding associated with Telecommunications.

The right-hand column gives suggested contexts, applications, illustrations and activities associated with the Content Statements.

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
1.1 Radio	
1 State that radio communication does not require wires between transmitter and receiver.	Use model transmitter and receiver to transmit a message across the laboratory.
2 State that radio signals are waves which transfer energy.	View suitable video on radio transmission and reception.
3 State that radio signals are transmitted through air at a speed of 300 million metres per second.	
4 Complete a block diagram of a radio receiver showing in the correct order: the aerial, tuner, decoder, amplifier and loudspeaker.	Construct a block diagram of a radio receiver. Assemble and examine the main parts of a radio receiver specially built to give a simple layout.
5 Describe in simple terms the function of the aerial, tuner, amplifier and loudspeaker in a radio receiver.	Experiments to investigate the function of the main parts of the radio.
6 State that the frequency of a radio signal is the number of waves produced in one second.	
7 State that frequency is measured in hertz.	
8 State that a radio station can be identified by the frequency of the signal it transmits.	Obtain information on the frequency of radio stations. Tune into different radio stations.

National Course Specification: course details (cont)

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
1.2 Television	
1 State that television signals are radio signals with a higher frequency.	Compare television and radio frequencies.
2 State that a television station can be identified by the frequency of the signal it transmits.	View suitable video on television transmission and reception.
3 Complete a block diagram of a television receiver showing in the correct order: the aerial, tuner, decoders, amplifiers, tube and loudspeaker.	Construct a block diagram of a television receiver.
4 Describe in simple terms the function of the aerial, tuner, amplifiers, tube and loudspeaker in a television receiver.	
5 State that mixing red, green and blue light produces all colours seen on a colour television screen.	Examine colour television screen or monitor. Investigate colour mixing using raybox kits and colour filters. Use a prism to produce a visible spectrum.
1.3 Satellites	
1 Describe how satellites are used in communication.	View suitable video on communication satellites.
2 State that a geostationary satellite stays above the same point on the Earth's surface.	Obtain information on communication satellites. Satellite TV.
3 State that curved reflectors on receiving aerials make the signal stronger.	Use raybox kits to investigate the focusing effect of curved reflectors. Simple ray diagrams to demonstrate the focusing effects of curved reflectors.
4 Explain why curved reflectors on receiving aerials make the signal stronger.	Direction and size of satellite dishes.

National Course Specification: course details (cont)

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
1.4 Optical fibres	
1 State that light can be reflected.	Use raybox kits to investigate reflection from a plane surface.
2 Describe the direction of the reflected light ray from a plane mirror.	
3 State what is meant by an optical fibre.	Use optical fibre to transmit a message.
4 State that optical fibres are used in some telecommunication systems.	View suitable video on fibre optic communication.
5 State that optical fibres transmit light signals.	
6 State that signal transmission along an optical fibre takes place at a speed of nearly 200 million metres per second.	
7 Describe the transmission of the light signal along an optical fibre.	Use raybox kits to investigate total internal reflection (qualitatively only). Simple ray diagram to show the path of light along an optical fibre.
8 State that many telecommunication links into the home are by optical fibres.	Obtain information on modern communication links to the home, eg cable television, home banking, Internet.
9 Describe one advantage and one disadvantage of using optical fibres for transmission of signals into the home.	Discuss advantages and disadvantages of optical fibre with radio communication.

National Course Specification: course details (cont)

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
1.5 Telephone	
1 State that in a telephone, coded messages or signals are sent out by a transmitter and are picked up by a receiver.	Use a pair of telephones to communicate through wires.
2 State that telephone communication may use electrical signals in metal wires, light signals in optical fibres or radio wave signals in air between transmitter and receiver.	
3 State that a mobile phone acts as a radio transmitter and receiver.	Obtain information on mobile phones.
4 State one advantage and one disadvantage of a mobile phone.	
5 State that the mouthpiece of a telephone is the transmitter and it contains a microphone.	Look at telephone handset – dismantle and identify mouthpiece and earpiece.
6 State that the earpiece of a telephone is the receiver and it contains a loudspeaker.	
7 State the useful energy changes in (a) a microphone (sound → electrical) (b) a loudspeaker (electrical → sound).	Investigate the energy changes in a microphone and a loudspeaker.
8 State that a telephone signal in a metal wire is transmitted very quickly, at a speed of almost 300 million metres per second.	
9 State that fax is the name given to the transmission of documents by telephone communication.	Obtain information on fax machines.
10 State one advantage of using fax.	
11 Describe the effect on the signal pattern displayed on an oscilloscope due to a change in: (a) loudness of sound (b) frequency of sound.	Investigate the electrical signals in telephone wires using an oscilloscope. Use signal generator and oscilloscope to look at frequency and loudness effects.

National Course Specification: course details (cont)

Intermediate 1 Physics: Practical Electricity

The Content Statements given in the left-hand column of the table below describe in detail what the candidate should be able to do in demonstrating knowledge and understanding associated with Practical Electricity.

The right-hand column gives suggested contexts, applications, illustrations and activities associated with the Content Statements.

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
2.1 Electrical circuits	
1 Draw and identify the circuit symbols for a battery, lamp and switch.	Match up component and circuit symbol.
2 State that a battery is a source of electrical energy.	
3 State that lamps, heaters and motors convert electrical energy into other forms.	
4 Describe a series circuit.	Set up a series circuit.
5 State that an ammeter is used to measure current.	Set and use ammeters and multimeters appropriately.
6 Draw and identify the circuit symbol for an ammeter.	
7 Draw a circuit diagram showing the correct position of an ammeter in the circuit.	Draw series circuit using appropriate symbols.
8 State that current is a flow of charge and is measured in amperes.	
9 State that in a series circuit, the current is the same at all points.	Measure current in series circuit.
10 Describe a parallel circuit.	Draw parallel circuit using appropriate symbols.
11 State that the sum of currents in two parallel branches is equal to the current drawn from the supply.	Set up parallel circuit. Measure current in a parallel circuit

National Course Specification: course details (cont)

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
2.1 Electrical circuits (cont)	
12 State that a voltmeter is used to measure voltage.	Set and use voltmeters and multimeters appropriately.
13 Draw and identify the circuit symbol for a voltmeter.	
14 Draw a circuit diagram showing the correct position of a voltmeter in a circuit.	
15 State that voltage is measured in volts.	
16 State that the sum of the voltages across components in series is equal to the voltage of the supply.	Measure voltage across lamps in series.
17 State that the voltage across two components in parallel is the same for each component.	Measure voltage across lamps in parallel. Examine practical situations of series and parallel circuits, eg car circuits.
2.2 Resistance	
1 Draw and identify the circuit symbol for a resistor and a variable resistor.	Match up component with circuit symbol.
2 State that resistors convert electrical energy into heat energy.	
3 State that an ohmmeter is used to measure resistance.	Use ohmmeter to measure resistance.
4 State that resistance is measured in ohms.	
5 State that an increase in resistance of a circuit leads to a decrease in the current in the circuit.	Measure current in a circuit for different values of resistance.
6 Calculate resistance using: $resistance = \frac{voltage}{current}$.	Measure current and voltage in a circuit containing a resistor and calculate *V/I*. Measure resistance using ohmmeter and compare with *V/I*.
7 Give two practical uses of a variable resistor.	Examine practical uses of variable resistors.

National Course Specification: course details (cont)

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
2.3 Mains electricity	
1 State that household wiring connects appliances in parallel so that they receive the same voltage.	Look at: consumer unit, diagrams and models of household wiring, rating plates of mains-operated appliances.
2 State that the declared value for mains voltage is 230 V.	
3 Draw and identify the circuit symbol for a fuse.	
4 Identify live, neutral and earth wires from the colour of their insulation.	Wire a ceiling rose, lamp and switch circuit using twin and earth 1.0 mm^2 cable.
5 Identify the live, neutral and earth terminals in a plug.	Wiring of household appliances.
6 Explain how a fuse acts as a safety device.	Demonstrate the action of a fuse.
7 State that electrical energy costs for the home increase as: (a) the power of the appliance increases (b) the time of use of the appliance increases.	Use meter to measure energy supplied in the same time to different appliances. Power cards. Investigate the wattage of various domestic appliances and compare the running costs. Rating plates.
8 Calculate current using: $current = \frac{power}{voltage}$.	
9 Use the above relationship to determine fuse values.	Select appropriate fuses for different appliances.
10 State that a circuit breaker is an automatic switch which can be used instead of a fuse.	Experiments with circuit breakers and 12V appliances. Examine various circuit breakers and fuses.
11 State that the human body is a conductor of electricity and that moisture increases its ability to conduct.	Experiment with 1.5V cell to demonstrate the conductivity of the human body when dry and when wet.
12 State that the earth wire is a safety device.	Experiments to demonstrate the importance of the earth wire.
13 State that electrical appliances, which have the double insulation symbol, do not require an earth wire.	Examine household appliances to see if an earth wire is fitted or a double insulation symbol is shown.
14 Explain why connecting too many appliances to one socket is dangerous.	
15 Explain why situations involving electricity could result in accidents.	Examine drawings to identify potential hazards in the incorrect use of electrical appliances.
16 Describe how to make a simple continuity tester.	
17 Describe how a continuity tester may be used to identify an open circuit.	Use simple continuity tester and ohmmeter to find circuit faults.

National Course Specification: course details (cont)

Intermediate 1 Physics: Radiations

The Content Statements given in the left-hand column of the table below describe in detail what the candidate should be able to do in demonstrating knowledge and understanding associated with Radiations.

The right-hand column gives suggested contexts, applications, illustrations and activities associated with the Content Statements.

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
3.1 Light	
1 State that a laser is a concentrated source of light of only one colour.	Demonstrate properties of lasers.
2 Describe how a laser is used in one practical application.	Obtain information on the uses of lasers.
3 State that light can be reflected.	
4 State that all visible objects give out, or reflect, light to the eye.	
5 Describe the direction of the reflected light ray from a plane mirror.	Use raybox kits to investigate reflection including total internal reflection.
6 Describe one use of optical fibres in medicine.	Optical fibres in medicine.
7 Describe the shapes of converging and diverging lenses.	
8 Describe the effect of a converging and a diverging lens on parallel rays of light.	Use raybox kits to investigate refraction with converging and diverging lens shapes.
9 Describe, in words or using a diagram, the eye defects called long and short sight.	Model eye to investigate long and short sight.
10 State that a converging lens can correct long sight and a diverging lens can correct short sight.	
3.2 X-rays	
1 State that X-rays are invisible to the naked eye.	Obtain information on X-rays.
2 State that photographic film may be used to detect X-rays.	Examine X-ray photographs. CAT scan.
3 Describe one use of X-rays in medicine.	View suitable video on the use of X-rays.
4 Describe one use of X-rays in industry.	Inspection of welded joints. Security inspection of luggage.
5 State that X-rays are dangerous since they can damage living cells.	Protection of radiographers

National Course Specification: course details (cont)

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
3.3 Gamma rays	
1 State that gamma radiation is invisible to the naked eye.	
2 State that gamma radiation can kill living cells or change the nature of living cells.	Obtain information on the use of gamma radiation in the treatment of cancer and sterilisation of instruments.
3 State that gamma radiation can pass through most materials.	Demonstrate the absorption of gamma rays using the Geiger Müller tube.
4 Describe how gamma radiation can be used as a tracer in both medicine and industry.	Simulate a tracer experiment emphasising that extremely small quantities of gamma radiation can be detected. View video on tracers.
5 State that the strength of a source of gamma radiation decreases with time.	
6 Describe the safety precautions needed when dealing with a source of gamma radiation.	Obtain information on the precautions necessary when handling radioactive substances.
7 State that there is gamma radiation present in our surroundings.	Measure background radiation.
3.4 Infrared and ultraviolet	
1 State that infrared radiation is invisible to the naked eye.	
2 State that infrared radiation is called heat radiation.	Heat lamps.
3 Describe one use of infrared radiation in medicine.	Obtain information on the uses of infrared radiation.
4 Describe one non-medical use of infrared radiation.	Thermograms. Infrared cameras. Night sights.
5 State that ultraviolet radiation is invisible to the naked eye.	
6 Describe one use of ultraviolet radiation in medicine.	Obtain information on the uses of ultraviolet radiation. ‘Sun’ beds, treatment of acne, vitamin D deficiency.
7 States that some chemicals glow ie fluoresce when they absorb ultraviolet radiation.	Soap powders, fluorescent lamps, disco lights.
8 Describe how ultraviolet radiation can be used in identifying security markings.	‘Invisible’ ink pens. Forged bank notes.
9 State that excessive exposure to ultraviolet radiation may produce skin cancer.	Sun tan. Sun tan creams. Effect of ozone layer.

National Course Specification: course details (cont)

Intermediate 1 Physics: Sound and Music

The Content Statements given in the left-hand column of the table below describe in detail what the candidate should be able to do in demonstrating knowledge and understanding associated with Sound and Music.

The right-hand column gives suggested contexts, applications, illustrations and activities associated with the Content Statements.

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
4.1 Sound waves	
1 State that for sound to be produced an object must vibrate.	Investigate various sounding objects.
2 State that sound is a wave which transfers energy.	Musical instruments, speech, loudspeaker.
3 State that the frequency of a sound is the number of waves produced in one second.	Use oscilloscope to compare frequencies.
4 State that frequency is measured in hertz.	
5 State that the higher the pitch of a sound the larger the frequency.	
6 Identify from oscilloscope traces the signal which would produce: (a) the louder sound (b) the higher frequency.	Use signal generator and oscilloscope to investigate frequency, amplitude and loudness effects. Slinky. Drums and cymbals.
7 State that if two sounds are one octave apart, the frequency of one is double the other.	Signal generator and oscilloscope to compare two pure tones one octave apart.
8 State that the frequency produced by a vibrating string can be increased by shortening the length of the string and increasing the tightness of the string.	Investigate the factors affecting the frequency produced by a vibrating string.
9 State that the frequency produced by a vibrating air column can be increased by shortening the length of the air column.	Investigate the frequency produced by a vibrating air column. Musical instruments. Synthesisers. Investigate instrument sounds using computer interface.

National Course Specification: course details (cont)

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
4.2 Speed of sound	
1 Give an example which shows that the speed of sound in air is less than the speed of light in air.	Produce sound and light signals at the same time. Thunder and lightning, sound switches and computer.
2 Describe a method for measuring the speed of sound in air using the relationship between distance, time and speed.	Measure the speed of sound in air – measure distance and time.
3 Calculate the speed of sound using: $speed = \frac{distance}{time}$.	
4.3 Using sound	
1 State that sound can pass through solids, liquids and gases.	Investigate the transmission of sound through solids, liquids and gases. Plastic cup and string 'telephone'.
2 State that sound cannot pass through a vacuum.	Bell in jar connected to vacuum pump.
3 State that the normal range of human hearing is from 20 hertz to 20,000 hertz.	Investigate range of hearing using signal generator and loudspeaker.
4 State that high frequency sounds beyond the range of human hearing are called ultrasounds.	High frequency deafness. Dog whistles. Bats.
5 Give one example of a use of ultrasound in medicine.	Medical uses of ultrasound.
6 Give one example of a non-medical use of ultrasound.	Sonar.
7 State that sound levels are measured in decibels.	Use sound level meter to measure 'noise'. Health and Safety, permitted decibel levels.
8 Give two examples of noise pollution.	
9 State that excessive noise can damage hearing.	Investigate ways of minimising the effects of noise, eg ear mufflers, double glazing, sound insulation.

National Course Specification: course details

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
4.4 Amplified sound	
1 State that the output signal from an amplifier has the same frequency but a bigger amplitude than the input signal.	Discuss various devices containing amplifiers. Use oscilloscope to compare the input to, and output from, an audio amplifier.
2 State the function of each of the three major components needed to amplify speech (microphone, amplifier, loudspeaker).	Put together a simple amplifier for use with a microphone and loudspeaker.
3 Define voltage gain of an amplifier in terms of input and output voltages.	Measure voltage gain of an amplifier. Hi-fi systems.
4 Calculate voltage gain using: $\textit{voltage gain} = \frac{\textit{output voltage}}{\textit{input voltage}}$.	
5 Explain why your recorded voice sounds different to you.	Study the use of graphic equalisers. Record and play back your own voice.
6 State the advantages of a compact disc compared to a tape cassette.	Obtain information on compact discs and tape cassettes.

National Course Specification: course details

Intermediate 1 Physics: Movement

The Content Statements given in the left-hand column of the table below describe in detail what the candidate should be able to do in demonstrating knowledge and understanding associated with Movement.

The right-hand column gives suggested contexts, applications, illustrations and activities associated with the Content Statements.

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
5.1 Forces	
1 Describe how to use a newton balance to measure force.	Investigate the effects of forces on an object.
2 State that weight is a force and is the Earth's pull on an object.	Use newton balance to lift and pull different objects.
3 Calculate weight using: *weight* = 10 x *mass.*	Find force needed to lift known masses and use results to show that the ratio of weight to mass is 10 newtons per kilogram.
4 State that the force of friction can oppose the motion of an object.	Investigate which type of surface has the best 'grip'.
5 Describe one way in which the force of friction can be increased.	
6 Describe one way in which the force of friction can be decreased.	Experiments on 'removing' friction. Lubrication, car tyres, brakes, road conditions, sports shoes.
7 State that streamlining reduces the effect of air friction on an object.	Investigate the effect of the shape of an object on reducing friction.
8 Describe two features of a car which improve streamlining.	
9 State that equal forces acting in opposite directions on an object are called balanced forces.	Tug-of-war, aircraft in flight, skydiver.
10 Identify situations where the forces acting on an object are (a) balanced (b) not balanced.	
11 State that when the forces acting on an object are balanced the movement of the object does not change.	Qualitative only – calculations are not required. Stationary objects and objects moving at constant speed in a straight line
12 State that when the forces acting on an object are not balanced the speed and/or direction of movement of the object changes.	Qualitative only – calculations are not required. Objects changing speed and objects changing direction.

National Course Specification: course details (cont)

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
5.2 Speed and acceleration	
1 Describe how to measure average speed.	Measure average speeds for everyday moving objects, eg car, student, bicycle. Average speeds for car, train and bus journeys. Average speeds for different athletic events.
2 Calculate average speed using: $average\ speed = \frac{distance}{time}$.	
3 Describe how to measure instantaneous speed.	VASCAR, TRUVELO, wind speed. Measure short time intervals and estimate the instantaneous speed.
4 Describe the term 'acceleration'.	Information on performance figures for cars.
5.3 Moving objects	
1 Describe how the effect of a collision increases with the mass and speed of the objects involved.	Observe collisions between objects – vary mass and speed. Linear air track experiments. Car collisions, rugby players. Observe motion in Newton's cradle.
2 State that the change in speed of an object increases with: (a) the size of the force acting (b) the time the force acts.	Investigate the effect of force and contact time on a ball. Racquet sports, hockey, cricket, etc.
3 State that the range of a ball thrown at an angle is affected by: (a) the speed of the throw (b) the angle of the throw.	Investigate the factors affecting the range of a ball thrown at an angle.
4 State that the height a ball rebounds on hitting a surface is affected by: (a) the speed on impact (b) the material of the surface (c) the material of the ball.	Investigate the factors affecting the rebound height of a ball.

National Course Specification: course details (cont)

Intermediate 1 Physics: Electronics

The Content Statements given in the left-hand column of the table below describe in detail what the candidate should be able to do in demonstrating knowledge and understanding associated with Electronics.

The right-hand column gives suggested contexts, applications, illustrations and activities associated with the Content Statements.

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
6.1 Input, process and output	
1 State that an electronic system consists of three parts: input, process and output.	Discuss practical systems in terms of input, process and output.
2 Identify from a block diagram the input, process and output subsystems of an electronic system.	
3 Draw a block diagram showing the input, process and output subsystems of an electronic system.	
4 State that the microphone, thermistor, LDR and switch are examples of input devices.	Carry out experiments to investigate the behaviour of the input devices listed.
5 State that a microphone changes sound energy to electrical energy.	
6 State that the resistance of a thermistor changes with temperature.	Use ohmmeter to measure resistance of thermistor at different temperatures.
7 State that the resistance of an LDR decreases as the light gets brighter.	Use ohmmeter to measure resistance of LDR at different light intensities.
8 Identify from a list an appropriate input device for a given application.	Examine uses of input devices.
9 State that an output device changes electrical energy into another form of energy.	

National Course Specification: course details (cont)

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
6.1 Input, process and output (cont)	
10 State that the loudspeaker, buzzer, lamp, LED and electric motor are examples of output devices.	Examine a range of output devices.
11 State the energy transformations involved for a given output device.	
12 Identify from a list an appropriate output device for a given application.	Examine uses of output devices.
6.2 Digital logic gates	
1 Draw and identify the symbols for two input AND and OR gates, and a NOT gate.	
2 State that: high voltage = logic 1; and low voltage = logic 0.	
3 State that for a NOT gate the output is the opposite of the input.	Use oscilloscope to examine digital signals.
4 State that for an AND gate both inputs must be high for the output to be high.	Investigate the truth tables for a NOT gate and two input AND and OR gates using a LED as detector.
5 State that for an OR gate either input must be high for the output to be high.	
6 Explain how to use combinations of digital logic gates for control in simple situations.	Examine simple applications of NOT, AND and OR gates using digital inputs in solving electronic problems, eg alarms, warning devices, etc.

National Course Specification: course details (cont)

COURSE Physics (Intermediate 1)

ASSESSMENT

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

When units are taken as component parts of a course, candidates will have the opportunity to demonstrate achievement beyond that required to attain each of the units. This attainment may, where appropriate, be recorded and used to contribute towards course estimates, and to provide evidence for appeals.

Further information on the key principles of assessment is provided in the paper *Assessment* (HSDU, 1996) and in *Managing Assessment* (HSDU, 1998).

Each unit specification gives information on unit assessment.

DETAILS OF THE INSTRUMENT FOR EXTERNAL ASSESSMENT

The instrument of assessment will be an externally set question paper of 1 hour 30 minutes duration. The question paper will sample the Content Statements of all six component units. The question paper will consist of a mixture of objective questions (each worth 1 mark) and questions requiring: a short answer (a few words); a response in the form of a numerical calculation; a restricted response (a few sentences). Candidates will be expected to answer all of the questions.

There will be a total of 84 marks for the paper.

Approximately 42 marks will be allocated to questions that require candidates to demonstrate achievement of a sample of the performance criteria associated with Outcome 1 for the six component units.

Approximately 42 marks will be allocated to questions that require candidates to:

- demonstrate achievement of a sample of the performance criteria associated with Outcome 2 and Outcome 3 for the six component units;
- integrate knowledge and understanding, problem solving and analytical skills acquired through the study of the component units;
- apply knowledge and understanding to solve problems in contexts which are less familiar than those associated with a study of the component units;
- solve problems which are less structured.

National Course Specification: course details (cont)

COURSE Physics (Intermediate 1)

A summary of the breakdown of the marks allocation across the outcomes and component units is as follows.

	Outcomes 1	*Outcomes 2 and 3*	*Total*
Mark allocation for:			
whole paper	42 ± 4	42 ± 4	84
each component unit (20 hour)	7 ± 3	7 ± 3	14 ± 4

GRADE DESCRIPTIONS

Course assessment will be based on achievement of the outcomes for the component units but will differ from the unit assessment in a number of regards. In undertaking the course assessment, candidates will be expected to demonstrate that the knowledge and understanding, problem solving and practical skills, which they acquired through their study of the component units, have been retained, and can be integrated and applied in less familiar contexts.

The grade descriptions below indicate the nature of the achievement which is required for the award of a grade C and a grade A in the course assessment.

Grade descriptions at 'C'

Candidates can:

- use the appropriate knowledge and understanding acquired through the study of the component units
- apply knowledge and understanding set in contexts similar to those associated with the component units
- demonstrate the ability to integrate skills acquired in component units to solve problems.

Grade descriptions at 'A'

Candidates can:

- apply knowledge and understanding to solve problems which are less structured or are set in less familiar contexts.

The above descriptions indicate the value of the course award over achievement of the individual units.

The overall assessment for the course, ie the combination of internal and external assessment, provides the necessary evidence for the core skills where an automatic award is made.

APPROACHES TO LEARNING AND TEACHING

The learning and teaching of physics are most effective when the concepts, principles and theories are set in a relevant context, eg by making reference to applications of physics and to real-world situations. Appropriate contexts, applications, illustrations and activities relating to the Content Statements are provided.

Practical activities provide opportunities to develop a wide range of skills associated with scientific inquiry and practical problem solving.

Suggested practical activities could include the following:

1 Measuring a physical quantity, eg after a class discussion candidates could be asked to design an experiment to measure the speed of sound. After completion of the experiment the readings and results could be analysed.

2 Demonstrating a physical law, eg candidates could be involved in the design of an experiment to investigate the relationship between the angle of incidence and the angle of reflection when a ray of light is incident on a plane mirror.

3 Testing a hypothesis, eg class discussion of the path taken by a ball thrown at an angle could lead to the hypothesis that increasing the angle of throw increases the range of the ball. Candidates can then design a suitable experiment to test this hypothesis.

The use of microcomputers is a powerful aid to learning and experimenting. When interfaced to suitable sensors, the microcomputer can assist in investigations where readings have to be taken very rapidly or over a long time, or where several different variables have to be recorded simultaneously. Data obtained can be analysed and presented in graphical displays.

Use of the additional 40 hours

This time may be used:

- to provide an introduction to the course and assessment methods
- to allow candidates to develop their ability to integrate knowledge and understanding, problem solving and practical skills acquired through the study of the different component units
- to allow some more practical work, on an individual basis if appropriate, within the units to enhance skills and understanding
- for consolidation and integration of learning
- for remediation
- for practice in examination techniques and preparation for the external examination.

SPECIAL NEEDS

This course specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Telecommunications (Intermediate 1)

NUMBER D373 10

COURSE Physics (Intermediate 1)

SUMMARY

The unit seeks to develop the candidate's knowledge and understanding of simple concepts and facts related to telecommunications. It also provides an opportunity for developing the ability to apply this knowledge and understanding in the analysis of simple problems.

OUTCOMES

1 Demonstrate knowledge and understanding related to telecommunications.
2 Solve problems related to telecommunications.
3 Report on one practical application of Intermediate 1 Physics.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates will normally be expected to have attained the following.

- Standard Grade Physics at grade 5, 6 or 7

or

- Standard Grade Biology, Chemistry or Science at grade 4, 5, 6 or 7

or

- appropriate Access units

CREDIT VALUE

0.5 credit at Intermediate 1.

Administrative Information

Superclass: RC

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 04

National Unit Specification: general information (cont)

UNIT Telecommunications (Intermediate 1)

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Telecommunications (Intermediate 1)

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

OUTCOME 1
Demonstrate knowledge and understanding related to telecommunications.

Performance criteria

(a) Quantities and their units are used correctly in relation to telecommunications.
(b) Methods are described correctly in relation to telecommunications.
(c) Facts are used correctly in relation to telecommunications.

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the Content Statements, given in the National Course Specification: course details, in each of the following areas:

- Radio
- Television
- Satellites
- Optical fibres
- Telephone.

OUTCOME 2
Solve problems related to telecommunications.

Performance criteria

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

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the areas shown below.

- Radio
- Television
- Satellites
- Optical fibres
- Telephone.

National Unit Specification: statement of standards (cont)

UNIT Telecommunications (Intermediate 1)

OUTCOME 3

Report on one practical application of Intermediate 1 Physics.

Performance criteria

(a) The sources of information are used appropriately.
(b) The practical application is described clearly.
(c) Conclusions drawn are valid.

Evidence requirements

A completed report, based on a given structure, on a practical use of radio or television or satellites or optical fibres or telephone, covering the above performance criteria is required. The report must be the individual work of the candidate.

An Outcome 3 report of practical work in the Intermediate 1 Physics unit D375 10 Radiations may be used as evidence of achievement of Outcome 3 of this unit. An Outcome 3 report of practical work in this unit may be used as evidence of achievement of Outcome 3 of the Intermediate 1 Physics unit D375 10 Radiations.

National Unit Specification: support notes

UNIT Telecommunications (Intermediate 1)

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

While the time allocated to this unit is at the discretion of the centre, the notional design length is 20 hours.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

The content and suggested contexts, applications, illustrations and activities for this unit are given in the National Course Specification: course details. The subheadings in the tables in the course details correspond to the areas mentioned in the evidence requirements for Outcome 1 and Outcome 2. The tasks chosen for Outcome 3 must relate to the content of Intermediate 1 Physics and must allow opportunity for all the performance criteria for this outcome to be achieved within any single report.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

The learning and teaching of this unit are most effective when the concepts, principles and theories are set in a relevant context, eg by making reference to applications of physics and to real-world situations. The use of the suggested contexts, applications, illustrations and activities is recommended. It is suggested that emphasis is given to practical activities and that the associated knowledge and understanding are developed during these activities. Practical activities also provide opportunities to develop a wide range of skills associated with scientific enquiry. Suitable approaches to learning and teaching are given in the National Course Specification.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2

It is recommended that a holistic approach is taken for assessment of Outcomes 1 and 2. These outcomes can be assessed by an end of unit test with questions covering all of the associated performance criteria. Within one question, assessment of knowledge and understanding and problem solving can occur. Each question can assess achievement of a number of performance criteria from either Outcome 1 or 2. Assessment items are available from the National Assessment Bank.

Outcome 3

The teacher/lecturer should ensure that the task relates to the content of Intermediate 1 Physics, that it is about a current practical application of physics and that it provides an appropriate level of demand. Candidates should be provided with an outline structure of a report.

In relation to PC(a), the teacher/lecturer should ensure that the candidate plays an active part in gathering information for the report. Candidates should have access to a range of suitable resources, eg, CD-ROM, library, internet.

In relation to PCs (b) and (c) the following provides and indication of what may be included in a candidate's report.

PC (b)
- a statement of name of the telecommunication system
- a few concise sentences describing the practical application

PC (c)
Conclusions should contain, as appropriate, a statement relating to:
- one advantage and one disadvantage of the application
- benefits of the application
- comment on effects of the application on individuals and/or society.

It is appropriate to give limited support to candidates in producing their reports. Re-drafting of reports after necessary supportive criticism is to be encouraged, both as part of the learning and teaching process and to produce evidence for assessment. Advice should be given on how to access suitable sources of information, eg CD-ROM, internet and library.

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).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Practical Electricity (Intermediate 1)

NUMBER D374 10

COURSE Physics (Intermediate 1)

SUMMARY

The unit seeks to develop the candidate's knowledge and understanding of simple concepts and facts related to electricity. It also provides an opportunity for developing the ability to apply this knowledge and understanding in the analysis of simple problems.

OUTCOMES

1 Demonstrate knowledge and understanding related to practical electricity.
2 Solve problems related to practical electricity.
3 Collect and analyse information related to Intermediate 1 Physics obtained by experiment.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates will normally be expected to have attained the following.

- Standard Grade Physics at grade 5, 6 or 7

or

- Standard Grade Biology, Chemistry or Science at grade 4, 5, 6 or 7

or

- appropriate Access units

CREDIT VALUE

0.5 credit at Intermediate 1.

Administrative Information

Superclass: RC

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 04

National Unit Specification: general information (cont)

UNIT Practical Electricity (Intermediate 1)

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Practical Electricity (Intermediate 1)

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

OUTCOME 1
Demonstrate knowledge and understanding related to practical electricity.

Performance criteria

(a) Quantities and their units are used correctly in relation to practical electricity.
(b) Relationships and mathematical techniques are used correctly in relation to practical electricity.
(c) Methods are described correctly in relation to practical electricity.
(d) Facts are used correctly in relation to practical electricity.
(e) Symbols are described correctly in relation to practical electricity.

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the Content Statements, given in the National Course Specification: course details, in each of the following areas:

- Electrical circuits
- Resistance
- Mains electricity.

OUTCOME 2
Solve problems related to practical electricity.

Performance criteria

(a) Relevant information is selected and presented appropriately.
(b) Information is accurately processed, using calculations where appropriate.
(c) Conclusions drawn are valid, and explanations given are supported by evidence.

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the areas shown below.

- Electrical circuits
- Resistance
- Mains electricity.

National Unit Specification: statement of standards (cont)

UNIT Practical Electricity (Intermediate 1)

OUTCOME 3

Collect and analyse information related to Intermediate 1 Physics obtained by experiment.

Performance criteria

(a) The information is collected by active participation in the experiment.
(b) The experimental procedures are described accurately.
(c) Relevant measurements and observations are recorded in an appropriate format.
(d) Recorded information is analysed and presented in an appropriate format.
(e) Conclusions drawn are valid.

Evidence requirements

A completed report, based on a given structure, of one experimental activity related to Intermediate 1 Physics covering the above performance criteria is required. Evidence submitted in support of attainment of PC (d) must be in the form of a table or graph as appropriate. The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from active participation in an experiment involving the candidate in planning the experiment; deciding how it is to be managed; identifying and obtaining the necessary resources; carrying out the experiment. Depending on the activity, the collection of the information may be through group work.

An Outcome 3 report of practical work in the Intermediate 1 Physics unit D376 10 Sound and Music or unit D377 10 Movement may be used as evidence of achievement of Outcome 3 of this unit. An Outcome 3 report of practical work in this unit may be used as evidence of achievement of Outcome 3 of the Intermediate 1 Physics units D376 10 Sound and Music and D377 10 Movement.

National Unit Specification: support notes

UNIT Practical Electricity (Intermediate 1)

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

While the time allocated to this unit is at the discretion of the centre, the notional design length is 20 hours.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

The content and suggested contexts, applications, illustrations and activities for this unit are given in the National Course Specification: course details. The subheadings in the tables in the course details correspond to the areas mentioned in the evidence requirements for Outcome 1 and Outcome 2. The practical activities chosen for Outcome 3 must relate to the content of Intermediate 1 Physics and must allow opportunity for all the performance criteria for this outcome to be achieved within any single report.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

The learning and teaching of this unit are most effective when the concepts, principles and theories are set in a relevant context, eg by making reference to applications of physics and to real-world situations. The use of the suggested contexts, applications, illustrations and activities is recommended. It is suggested that emphasis is given to practical activities and that the associated knowledge and understanding are developed during these activities. Practical activities also provide opportunities to develop a wide range of skills associated with scientific enquiry. Suitable approaches to learning and teaching are given in the National Course Specification.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2

It is recommended that a holistic approach is taken for assessment of Outcomes 1 and 2. These outcomes can be assessed by an end of unit test with questions covering all of the associated performance criteria. Within one question, assessment of knowledge and understanding and problem solving can occur. Each question can assess achievement of a number of performance criteria from either Outcome 1 or 2. Assessment items are available from the National Assessment Bank.

Outcome 3

The teacher/ lecturer should ensure that the experimental activity to be undertaken in connection with the assessment of Outcome 3 affords opportunity for the candidate to demonstrate the ability to undertake the planning and organising of an experimental activity at an appropriate level of demand. The activity must relate to the content of Intermediate 1 Physics and candidates should be made aware of the range of skills which must be demonstrated to ensure attainment of Outcome 3. Candidates should be provided with an outline structure of a report.

In relation to PC (a), the teacher/lecturer should check by observation that the candidate participates in the collection of the experimental information by playing an active part in planning the experiment, deciding how it will be managed, identifying and obtaining resources and carrying out the experiment.

In relation to PCs (b) to (e) the following provides an indication of what may be included in a candidate's report.

PC (b)
Many experiments will follow a given procedure or method hence there is no need for a detailed description. The procedure may be described briefly in outline. The impersonal passive voice should be encouraged. The following should be included, as appropriate:

- aim of the experiment
- a labelled diagram, description of apparatus, instruments used
- how the independent variable was altered
- how measurements were taken or observations made.

PC (c)
Readings or observations should be recorded in a clear table. The table must include:

- correct headings
- appropriate units
- correctly entered readings/observations.

PC (d)
Readings should be analysed and presented using the following, as appropriate:

- a table with suitable headings and units
- a table with ascending or descending independent variable
- a table showing appropriate computations
- a graph with independent and dependent variables plotted
- a graph with suitable scales and axes labelled with quantities and units
- a graph with data correctly plotted with a line of best fit
- a bar chart.

PC (e)
Conclusions should contain, as appropriate, a statement relating to:

- overall pattern to readings or observations
- trends in analysed information or results
- measurement of a physical quantity.

The references under each performance criterion give an indication of what should be provided as evidence in order to achieve the criterion. The relevance of these will vary according to the experiment. These references are intended to assist the teacher/lecturer in making a judgement of the candidate's achievement against the performance criteria. It is appropriate to support candidates in producing their reports. Re-drafting of reports after necessary supportive criticism is to be encouraged, both as part of the learning and teaching process and to produce evidence for assessment.

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).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Radiations (Intermediate 1)

NUMBER D375 10

COURSE Physics (Intermediate 1)

SUMMARY

The unit seeks to develop the candidate's knowledge and understanding of simple concepts and facts related to radiations. It also provides an opportunity for developing the ability to apply this knowledge and understanding in the analysis of simple problems.

OUTCOMES

1 Demonstrate knowledge and understanding related to radiations.
2 Solve problems related to radiations.
3 Report on one practical application of Intermediate 1 Physics.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates will normally be expected to have attained the following.

- Standard Grade Physics at grade 5, 6 or 7

or

- Standard Grade Biology, Chemistry or Science at grade 4, 5, 6 or 7

or

- appropriate Access units

CREDIT VALUE

0.5 credit at Intermediate 1.

Administrative Information

Superclass: RC

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 04

National Unit Specification: general information (cont)

UNIT Radiations (Intermediate 1)

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Radiations (Intermediate 1)

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

OUTCOME 1
Demonstrate knowledge and understanding related to radiations.

Performance criteria

(a) Facts are used correctly in relation to radiations.
(b) Methods are described correctly in relation to radiations.

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the Content Statements, given in the National Course Specification: course details, in each of the following areas:

- Light
- X-rays
- Gamma rays
- Infrared and ultraviolet.

OUTCOME 2
Solve problems related to radiations.

Performance criteria

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

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the areas shown below.

- Light
- X-rays
- Gamma rays
- Infrared and ultraviolet.

National Unit Specification: statement of standards (cont)

UNIT Radiations (Intermediate 1)

OUTCOME 3
Report on one practical application of Intermediate 1 Physics.

Performance criteria

(a) The sources of information are used appropriately.
(b) The practical application is described clearly.
(c) Conclusions drawn are valid.

Evidence requirements

A completed report, based on a given structure, on a practical use of X-rays or gamma rays, or ultraviolet, or infrared or lasers, in a medical or non-medical context and covering the above performance criteria is required. The report must be the individual work of the candidate.

An Outcome 3 report of practical work in the Intermediate 1 Physics unit D373 10 Telecommunications may be used as evidence of achievement of Outcome 3 of this unit. An Outcome 3 report of practical work in this unit may be used as evidence of achievement of Outcome 3 of the Intermediate 1 Physics unit D373 10 Telecommunications.

National Unit Specification: support notes

UNIT Radiations (Intermediate 1)

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

While the time allocated to this unit is at the discretion of the centre, the notional design length is 20 hours.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

The content and the suggested contexts, applications, illustrations and activities for this unit are given in the National Course Specification: course details. The subheadings in the tables in the course details correspond to the areas mentioned in the evidence requirements for Outcome 1 and Outcome 2. The tasks chosen for Outcome 3 must relate to the content of Intermediate 1 Physics and must allow opportunity for all the performance criteria for this outcome to be achieved within any single report.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

The learning and teaching of this unit are most effective when the concepts, principles and theories are set in a relevant context, eg by making reference to applications of physics and to real-world situations. The use of the suggested contexts, applications, illustrations and activities is recommended. It is suggested that emphasis is given to practical activities and that the associated knowledge and understanding are developed during these activities. Practical activities also provide opportunities to develop a wide range of skills associated with scientific enquiry. Suitable approaches to learning and teaching are given in the National Course Specification.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2

It is recommended that a holistic approach is taken for assessment of Outcomes 1 and 2. These outcomes can be assessed by an end of unit test with questions covering of all of the associated performance criteria. Within one question, assessment of knowledge and understanding and problem solving can occur. Each question can assess achievement of a number of performance criteria from either Outcome 1 or 2. Assessment items are available from the National Assessment Bank.

Outcome 3

The teacher/lecturer should ensure that the task relates to the content of Intermediate 1 Physics, that it is about a current practical application of physics and that it provide an appropriate level of demand. Candidates should be provided with an outline structure of a report.

In relation to PC(a), the teacher/lecturer should ensure that the candidate plays an active part in gathering information for the report. Candidates should have access to a range of suitable resources, eg, CD-ROM, library, internet.

In relation to PCs (b) and (c) the following provides and indication of what may be included in a candidate's report.

PC (b)
- a statement of name of the radiation
- a few concise sentences describing the practical application

PC (c)
Conclusions should contain, as appropriate, a statement relating to:
- one advantage and one disadvantage of the application
- benefits of the application
- comment on effects of the application on individuals and/or society.

It is appropriate to give limited support to candidates in producing their reports. Re-drafting of reports after necessary supportive criticism is to be encouraged both as part of the learning and teaching process and to produce evidence for assessment. Advice should be given on how to access suitable sources of information, eg CD-ROM, internet, and library.

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).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Sound and Music (Intermediate 1)

NUMBER D376 10

COURSE Physics (Intermediate 1)

SUMMARY

The unit seeks to develop the candidate's knowledge and understanding of simple concepts and facts related to sound and music. It also provides an opportunity for developing the ability to apply this knowledge and understanding in the analysis of simple problems.

OUTCOMES

1 Demonstrate knowledge and understanding related to sound and music.
2 Solve problems related to sound and music.
3 Collect and analyse information related to Intermediate 1 Physics obtained by experiment.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidate will normally be expected to have attained the following.

- Standard Grade Physics at grade 5, 6 or 7

or

- Standard Grade Biology, Chemistry or Science at grade 4, 5, 6 or 7

or

- appropriate Access units

CREDIT VALUE

0.5 credit at Intermediate 1.

Administrative Information

Superclass: RC

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 04

National Unit Specification: general information (cont)

UNIT Sound and Music (Intermediate 1)

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Sound and Music (Intermediate 1)

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

OUTCOME 1
Demonstrate knowledge and understanding related to sound and music.

Performance criteria

(a) Quantities and their units are used correctly in relation to sound and music.
(b) Relationships and mathematical techniques are used correctly in relation to sound and music.
(c) Methods are described correctly in relation to sound and music.
(d) Facts are used correctly in relation to sound and music.

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the Content Statements, given in the National Course Specification: course details, in each of the following areas:

- Sound waves
- Speed of sound
- Using sound
- Amplified sound.

OUTCOME 2
Solve problems related to sound and music.

Performance criteria

(a) Relevant information is selected and presented appropriately.
(b) Information is accurately processed, using calculations where appropriate.
(c) Conclusions drawn are valid, and explanations given are supported by evidence.

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the areas shown below.

- Sound waves
- Speed of sound
- Using sound
- Amplified sound.

National Unit Specification: statement of standards (cont)

UNIT Sound and Music (Intermediate 1)

OUTCOME 3

Collect and analyse information related to Intermediate 1 Physics obtained by experiment.

Performance criteria

(a) The information is collected by active participation in the experiment.
(b) The experimental procedures are described accurately.
(c) Relevant measurements and observations are recorded in an appropriate format.
(d) Recorded information is analysed and presented in an appropriate format.
(e) Conclusions drawn are valid.

Evidence requirements

A completed report, based on a given structure, of one experimental activity related to Intermediate 1 Physics covering the above performance criteria is required. Evidence submitted in support of attainment of PC (d) must be in the form of a table or graph as appropriate. The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from active participation in an experiment involving the candidate in planning the experiment; deciding how it is to be managed; identifying and obtaining the necessary resources; carrying out the experiment. Depending on the activity, the collection of the information may be through group work.

An Outcome 3 report of practical work in the Intermediate 1 Physics unit D374 10 Practical Electricity or unit D377 10 Movement may be used as evidence of achievement of Outcome 3 of this unit. An Outcome 3 report of practical work in this unit may be used as evidence of achievement of Outcome 3 of the Intermediate 1 Physics units D374 10 Practical Electricity and unit D377 10 Movement.

National Unit Specification: support notes

UNIT Sound and Music (Intermediate 1)

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

While the time allocated to this unit is at the discretion of the centre, the notional design length is 20 hours.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

The content and suggested contexts, applications, illustrations and activities for this unit are given in the National Course Specification: course details. The subheadings in the tables in the course details correspond to the areas mentioned in the evidence requirements for Outcome 1 and Outcome 2. The practical activities chosen for Outcome 3 must relate to the content of Intermediate 1 Physics and must allow opportunity for all the performance criteria for this outcome to be achieved within any single report.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

The learning and teaching of this unit are most effective when the concepts, principles and theories are set in a relevant context, eg by making reference to applications of physics and to real-world situations. The use of the suggested contexts, applications, illustrations and activities is recommended. It is suggested that emphasis is given to practical activities and that the associated knowledge and understanding are developed during these activities. Practical activities also provide opportunities to develop a wide range of skills associated with scientific enquiry. Suitable approaches to learning and teaching are given in the National Course Specification.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2

It is recommended that a holistic approach is taken for assessment of Outcomes 1 and 2. These outcomes can be assessed by an end of unit test with questions covering all of the associated performance criteria. Within one question, assessment of knowledge and understanding and problem solving can occur. Each question can assess achievement of a number of performance criteria from either Outcome 1 or 2. Assessment items are available from the National Assessment Bank.

Outcome 3

The teacher/ lecturer should ensure that the experimental activity to be undertaken in connection with the assessment of Outcome 3 affords opportunity for the candidate to demonstrate the ability to undertake the planning and organising of an experimental activity at an appropriate level of demand. The activity must relate to the content of Intermediate 1 Physics and candidates should be made aware of the range of skills which must be demonstrated to ensure attainment of Outcome 3. Candidates should be provided with an outline structure of a report.

In relation to PC (a), the teacher/lecturer should check by observation that the candidate participates in the collection of the experimental information by playing an active part in planning the experiment, deciding how it will be managed, identifying and obtaining resources and carrying out the experiment.

In relation to PCs (b) to (e) the following provides an indication of what may be included in a candidate's report.

PC (b)
Many experiments will follow a given procedure or method hence there is no need for a detailed description. The procedure may be described briefly in outline. The impersonal passive voice should be encouraged. The following should be included, as appropriate:

- aim of the experiment
- a labelled diagram, description of apparatus, instruments used
- how the independent variable was altered
- how measurements were taken or observations made.

PC (c)
Readings or observations should be recorded in a clear table. The table must include:

- correct headings
- appropriate units
- correctly entered readings/observations.

PC (d)
Readings should be analysed and presented using the following, as appropriate:

- a table with suitable headings and units
- a table with ascending or descending independent variable
- a table showing appropriate computations
- a graph with independent and dependent variables plotted
- a graph with suitable scales and axes labelled with quantities and units
- a graph with data correctly plotted with a line of best fit
- a bar chart.

PC (e)
Conclusions should contain, as appropriate, a statement relating to:

- overall pattern to readings or observations
- trends in analysed information or results
- measurement of a physical quantity.

The references under each performance criterion give an indication of what should be provided as evidence in order to achieve the criterion. The relevance of these will vary according to the experiment. These references are intended to assist the teacher/lecturer in making a judgement of the candidate's achievement against the performance criteria. It is appropriate to support candidates in producing their reports. Re-drafting of reports after necessary supportive criticism is to be encouraged, both as part of the learning and teaching process and to produce evidence for assessment.

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).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Movement (Intermediate 1)

NUMBER D377 10

COURSE Physics (Intermediate 1)

SUMMARY

The unit seeks to develop the candidate's knowledge and understanding of simple concepts and facts related to movement. It also provides an opportunity for developing the ability to apply this knowledge and understanding in the analysis of simple problems.

OUTCOMES

1 Demonstrate knowledge and understanding related to movement.
2 Solve problems related to movement.
3 Collect and analyse information related to Intermediate 1 Physics obtained by experiment.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates will normally be expected to have attained the following.

- Standard Grade Physics at grade 5, 6 or 7

or

- Standard Grade Biology, Chemistry or Science at grade 4, 5, 6 or 7

or

- appropriate Access units

CREDIT VALUE

0.5 credit at Intermediate 1

Administrative Information

Superclass: RC

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 04

National Unit Specification: general information (cont)

UNIT Movement (Intermediate 1)

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Movement (Intermediate 1)

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

OUTCOME 1
Demonstrate knowledge and understanding related to movement.

Performance criteria

(a) Quantities and their units are used correctly in relation to movement.
(b) Relationships and mathematical techniques are used correctly in relation to movement.
(c) Methods are described correctly in relation to movement.
(d) Facts are used correctly in relation to movement.

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the Content Statements, given in the National Course Specification: course details, in each of the following areas:

- Forces
- Speed and acceleration
- Moving objects.

OUTCOME 2
Solve problems related to movement.

Performance criteria

(a) Relevant information is selected and presented appropriately.
(b) Information is accurately processed using calculations where appropriate.
(c) Conclusions drawn are valid, and explanations given are supported by evidence.

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the areas shown below.

- Forces
- Speed and acceleration
- Moving objects.

National Unit Specification: statement of standards (cont)

UNIT Movement (Intermediate 1)

OUTCOME 3

Collect and analyse information related to Intermediate 1 Physics obtained by experiment.

Performance criteria

(a) The information is collected by active participation in the experiment.
(b) The experimental procedures are described accurately.
(c) Relevant measurements and observations are recorded in an appropriate format.
(d) Recorded information is analysed and presented in an appropriate format.
(e) Conclusions drawn are valid.

Evidence requirements

A completed report, based on a given structure, of one experimental activity related to Intermediate 1 Physics covering the above performance criteria is required. Evidence submitted in support of attainment of PC (d) must be in the form of a table or graph as appropriate. The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from active participation in an experiment involving the candidate in planning the experiment; deciding how it is to be managed; identifying and obtaining the necessary resources; carrying out the experiment. Depending on the activity, the collection of the information may be through group work.

An Outcome 3 report of practical work in the Intermediate 1 Physics unit D374 10 Practical Electricity or D376 10 Sound and Music may be used as evidence of achievement of Outcome 3 of this unit. An Outcome 3 report of practical work in this unit may be used as evidence of achievement of Outcome 3 of the Intermediate 1 Physics units D374 10 Practical Electricity and unit D376 10 Sound and Music.

National Unit Specification: support notes

UNIT Movement (Intermediate 1)

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

While the time allocated to this unit is at the discretion of the centre, the notional design length is 20 hours.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

The content and suggested contexts, applications, illustrations and activities for this unit are given in the National Course Specification: course details. The subheadings in the tables in the course details correspond to the areas mentioned in the evidence requirements for Outcome 1 and Outcome 2. The practical activities chosen for Outcome 3 must relate to the content of Intermediate 1 Physics and must allow opportunity for all the performance criteria for this outcome to be achieved within any single report.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

The learning and teaching of this unit are most effective when the concepts, principles and theories are set in a relevant context, eg by making reference to applications of physics and to real-world situations. The use of the suggested contexts, applications, illustrations and activities is recommended. It is suggested that emphasis is given to practical activities and that the associated knowledge and understanding are developed during these activities. Practical activities also provide opportunities to develop a wide range of skills associated with scientific enquiry. Suitable approaches to learning and teaching are given in the National Course Specification.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2

It is recommended that a holistic approach is taken for assessment of Outcomes 1 and 2. These outcomes can be assessed by an end of unit test with questions covering all of the associated performance criteria. Within one question, assessment of knowledge and understanding and problem solving can occur. Each question can assess achievement of a number of performance criteria from either Outcome 1 or 2. Assessment items are available from the National Assessment Bank.

Outcome 3

The teacher/ lecturer should ensure that the experimental activity to be undertaken in connection with the assessment of Outcome 3 affords opportunity for the candidate to demonstrate the ability to undertake the planning and organising of an experimental activity at an appropriate level of demand. The activity must relate to the content of Intermediate 1 Physics and candidates should be made aware of the range of skills which must be demonstrated to ensure attainment of Outcome 3. Candidates should be provided with an outline structure of a report.

In relation to PC (a), the teacher/lecturer should check by observation that the candidate participates in the collection of the experimental information by playing an active part in planning the experiment, deciding how it will be managed, identifying and obtaining the resources and carrying out the experiment.

In relation to PCs (b) to (e) the following provides an indication of what may be included in a candidate's report.

PC (b)
Many experiments will follow a given procedure or method hence there is no need for a detailed description. The procedure may be described briefly in outline. The impersonal passive voice should be encouraged. The following may be included, as appropriate:

- aim of the experiment
- a labelled diagram, description of apparatus, instruments used
- how the independent variable was altered
- how measurements were taken or observations made.

PC (c)
Readings or observations should be recorded in a clear table. The table must include:

- correct headings
- appropriate units
- correctly entered readings/observations.

PC (d)
Readings should be analysed/presented using the following as appropriate:

- a table with suitable headings and units
- a table with ascending or descending independent variable
- a table showing appropriate computations
- a graph with independent and dependent variables plotted
- a graph with suitable scales and axes labelled with quantities and units
- a graph with data correctly plotted with a line or a curve of best fit
- a bar chart.

PC (e)
Conclusions should contain, as appropriate, a statement relating to:

- overall pattern to readings or observations
- trends in analysed information or results
- measurement of a physical quantity.

The references under each performance criterion give an indication of what should be provided as evidence in order to achieve the criterion. The relevance of these will vary according to the experiment. These references are intended to assist the teacher/lecturer in making a judgement of the candidate's achievement against the performance criteria It is appropriate to support candidates in producing their reports. Re-drafting of reports after necessary supportive criticism is to be encouraged, both as part of the learning and teaching process and to produce evidence for assessment.

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).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Electronics (Intermediate 1)

NUMBER D378 10

COURSE Physics (Intermediate 1)

SUMMARY

The unit seeks to develop the candidate's knowledge and understanding of simple concepts and facts related to electronics. It also provides an opportunity for developing the ability to apply this knowledge and understanding in the analysis of simple problems.

OUTCOMES

1 Demonstrate knowledge and understanding related to electronics.
2 Solve problems related to electronics.
3 Use a systems approach to produce a practical solution to a simple, real-life problem.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates will normally be expected to have attained the following.

- Standard Grade Physics at grade 5, 6 or 7

or

- Standard Grade Biology, Chemistry or Science at grade 4, 5, 6 or 7

or

- appropriate Access units

CREDIT VALUE

0.5 credit at Intermediate 1

Administrative Information

Superclass: RC

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 04

National Unit Specification: general information (cont)

UNIT Electronics (Intermediate 1)

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Electronics (Intermediate 1)

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

OUTCOME 1
Demonstrate knowledge and understanding related to electronics.

Performance criteria

(a) Methods are described correctly in relation to electronics.
(b) Facts are used correctly in relation to electronics.
(c) Symbols are described correctly in relation to electronics.

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the Content Statements, given in the National Course Specification: course details, in each of the following areas:

- Input, process and output
- Digital logic gates.

OUTCOME 2
Solve problems related to electronics.

Performance criteria

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

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the areas shown below.

- Input, process and output
- Digital logic gates.

National Unit Specification: statement of standards (cont)

UNIT Electronics (Intermediate 1)

OUTCOME 3

Use a systems approach to produce a practical solution to a simple, real-life problem.

Performance criteria

(a) Selected sub-systems are appropriate for a specific function.
(b) Justification for choice of each sub-system is correctly made.
(c) Sub-systems are correctly assembled.
(d) System provides a solution to the problem.

Evidence requirements

One report, based on a given structure, of a practical solution to a real-life problem related to electronics and covering the above performance criteria is required. The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from active participation in problem solving activities involving the candidate in planning the activities; deciding how the activities are to be managed; identifying and obtaining the necessary resources; carrying out the activities. The report must contain a block diagram of the system and a written justification of the choice of sub-systems. An explanation of how the system functions in terms of the sub-systems selected must also be included.

National Unit Specification: support notes

UNIT Electronics (Intermediate 1)

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

While the time allocated to this unit is at the discretion of the centre, the notional design length is 20 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

The content and suggested contexts, applications, illustrations and activities for this unit are given in the National Course Specification: course details. The subheadings in the tables in the course details correspond to the areas mentioned in the evidence requirements for Outcome 1 and Outcome 2. The practical activities chosen for Outcome 3 must relate to the content of the unit and must allow opportunity for all the performance criteria for this outcome to be achieved within any single report.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

The learning and teaching of this unit are most effective when the concepts, principles and theories are set in a relevant context, eg by making reference to applications of physics and to real-world situations. The use of the suggested contexts, applications, illustrations and activities is recommended. It is suggested that emphasis is given to practical activities and that the associated knowledge and understanding are developed during these activities. Practical activities also provide opportunities to develop a wide range of skills associated with scientific enquiry. Suitable approaches to learning and teaching are given in the National Course Specification.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2

It is recommended that a holistic approach is taken for assessment of Outcomes 1 and 2. These outcomes can be assessed by an end of unit test with questions covering all of the associated performance criteria. Within one question, assessment of knowledge and understanding and problem solving can occur. Each question can assess achievement of a number of performance criteria from either Outcome 1 or 2. Assessment items are available from the National Assessment Bank.

Outcome 3

The teacher/lecturer should ensure that the activities undertaken in connection with the assessment of Outcome 3 present a practical real-life problem. The activities must relate to the unit content and be at an appropriate level of demand. Candidates should be provided with an outline structure of a report.

In relation to PC (c) the teacher/lecturer should check by observation that the system is assembled correctly.

In relation to PCs (a), (b) and (d), the following provides an indication of what may be included in a candidate's report.

National Unit Specification: support notes (cont)

UNIT Electronics (Intermediate 1)

PC (a)
Comments should be provided on the selected sub-systems with:

- a description of the problem to be solved
- a statement of the name of the input device
- a statement of the name of the output device
- a statement of the name of the processor.

PC (b)
The choice of each sub-system should be justified by:

- a clear sentence indicating why the input device was chosen
- a clear sentence indicating why the output device was chosen
- a clear sentence indicating why the processor was chosen.

PC (d)
A few concise sentences describing how the system works should be provided.

The references under each performance criterion give an indication of what should be provided as evidence in order to achieve the criterion. These references are intended to assist the teacher/lecturer in making a judgement of the candidate's achievement against the performance criteria. It is appropriate to give limited support to candidates in producing their reports. Re-drafting of reports after necessary supportive criticism is to be encouraged both as part of the learning and teaching process and to produce evidence for assessment.

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).