

National Unit Specification: general information

UNIT Radiations (Access 3)

NUMBER D375 09

CLUSTER Physics (Access 3)

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 handling of information related to radiations.

OUTCOMES

1. Handle information related to radiations.
2. Report on one practical application of Access 3 Physics.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates will normally be expected to have attained appropriate Access 2 units.

CREDIT VALUE

0.5 credit at Access 3.

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).

Administrative Information

Superclass: RC
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Additional copies of this unit specification can be purchased from the Scottish Qualifications Authority. The cost for each unit specification is £2.50 (minimum order £5).

National Unit Specification: statement of standards

UNIT Radiations (Access 3)

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

OUTCOME 1

Handle information related to radiations.

Performance criteria

- (a) Facts are used correctly in relation to radiations.
- (b) Relevant information is selected and presented appropriately.
- (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 Content Statements in each of the following areas:

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

OUTCOME 2

Report on one practical application of Access 3 Physics.

Performance criteria

- (a) The sources of information are used appropriately.
- (b) The practical application is described clearly.
- (a) 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 Access 3 Physics unit D373 09 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 Access 3 Physics unit D373 09 Telecommunications.

National Unit Specification: support notes

UNIT Radiations (Access 3)

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

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

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

The content and suggested contexts, applications, illustrations and activities for this unit are given on the following pages. The subheadings in the tables correspond to the areas mentioned in the evidence requirements for Outcome 1. The tasks chosen for Outcome 2 must relate to the content of Access 3 Physics and must allow opportunity for all the performance criteria for this outcome to be demonstrated 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 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.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcome 1

This outcome is assessed by an end of unit test with questions covering all of the associated performance criteria. Each question can assess achievement of a number of performance criteria. Assessment items are available from the National Assessment Bank.

Outcome 2

The teacher/lecturer should ensure that the task relates to the content of Access 3 Physics, that it is about a current 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 an indication of what may be included in a candidate's report.

National Unit Specification: support notes (cont)

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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 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).

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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
<p>3.1 Light</p> <ol style="list-style-type: none"> 1 State that the laser is a concentrated source of light of only one colour. 2 Describe how the laser is used in one practical application. 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. 6 Describe one use of 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. 9 Describe, in words or using a diagram, the eye defects called long and short sight. 10 State that a converging lens can correct long sight and a diverging lens can correct short sight. <p>3.2 X-rays</p> <ol style="list-style-type: none"> 1 State that X-rays are invisible to the naked eye. 2 State that photographic film may be used to detect X-rays. 3 Describe one use of X-rays in medicine. 4 Describe one use of X-rays in industry. 5 State that X-rays are dangerous since they can damage living cells. 	<p>Demonstrate properties of laser. Obtain information on the uses of lasers.</p> <p>Use raybox kits to investigate reflection including total internal reflection. Optical fibres in medicine.</p> <p>Use raybox kits to investigate refraction with converging and diverging lens shapes. Model eye to investigate long and short sight.</p> <p>Obtain information on X-rays. Examine X-ray photographs. CAT scan. View suitable video on the use of X-rays. Inspection of welded joints. Security inspection of luggage. Protection of radiographers</p>

National Unit Specification: support notes (cont)

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CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
<p>3.3 Gamma rays</p> <ol style="list-style-type: none"> 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. 3 State that gamma radiation can pass through most materials. 4 Describe how gamma radiation can be used as a tracer in both medicine and industry. 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. 7 State that there is gamma radiation present in our surroundings. <p>3.4 Infrared and ultraviolet</p> <ol style="list-style-type: none"> 1 State that infrared radiation is invisible to the naked eye. 2 State that infrared radiation is called heat radiation. 3 Describe one use of infrared radiation in medicine. 4 Describe one non-medical use of infrared radiation. 5 State that ultraviolet radiation is invisible to the naked eye. 6 Describe one use of ultraviolet radiation in medicine. 7 State that some chemicals glow ie fluoresce when they absorb ultraviolet radiation ie fluoresce 8 Describe how ultraviolet radiation can be used in identifying security markings. 9 State that excessive exposure to ultraviolet radiation may produce skin cancer. 	<p>Obtain information on the use of gamma radiation in the treatment of cancer and sterilisation of instruments. Demonstrate the absorption of gamma rays using the Geiger Müller tube. Simulate a tracer experiment emphasising that extremely small quantities of gamma radiation can be detected. View video on tracers.</p> <p>Obtain information on the precautions necessary when handling radioactive substances. Measure background radiation.</p> <p>Heat lamps. Obtain information on the uses of infrared radiation. Thermograms. Infrared cameras. Night sights.</p> <p>Obtain information on the uses of ultraviolet radiation. 'Sun' beds, treatment of acne, vitamin D deficiency. Soap powders, fluorescent lamps, disco lights.</p> <p>'Invisible' ink pens. Forged bank notes.</p> <p>Sun tan. Sun tan creams. Effect of ozone layer.</p>