

National Unit Specification: General Information

UNIT Science in Context 2 (Intermediate 2)

NUMBER D940 11

COURSE

SUMMARY

This unit is designed to further develop the candidate's handling information and problem solving skills in a scientific context.

This unit can be used in conjunction with D941 11 Science Investigation Skills (Intermediate 2).

OUTCOMES

- 1 Produce a report on a scientific topic.
- 2 Use algebraic formulae to calculate scientific quantities.
- 3 Draw valid conclusions and use them to predict what might happen in similar situations.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following:

- 3161101 Science in Context 1
- D942 10 Science Practical Skills (Intermediate 1)
- Standard Grade Biology, Chemistry, Physics or Science at grade 3
- Intermediate 1 Biology, Chemistry or Physics.

Administrative Information

Superclass: RA

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CREDIT VALUE

1 credit at Intermediate 2.

CORE SKILLS

Information on the automatic certification of any core skills in this unit is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

National unit specification: statement of standards

UNIT Science in Context 2 (Intermediate 2)

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

Note on range for the unit

The report produced should be on a scientific topic and the plan for gathering information should be drawn up in a group. Several algebraic formulae should be used in calculations and the calculations should involve a number of operations.

OUTCOME 1

Produce a report on a scientific topic.

Performance Criteria

- a) A clear plan of action is devised with others to gather all needed information.
- b) The information is gathered and collated by the group.
- c) The candidate produces own report from information gathered in a clear and scientifically accurate form.
- d) Data and graphical information is clearly presented and interpreted.
- e) A clear and accurate explanation is given orally of a scientific concept.
- f) The candidate assesses own contribution to the work of the group.

Evidence Requirements

Evidence of achievement of this outcome should be provided in written and oral format to ensure that all the performance criteria have been met.

The evidence must show that the candidate can combine information from a number of sources, can assess the relevance of the information selected and can evaluate the information obtained.

The report should be between 500 and 1000 words on a given topic or practical experiment. The candidate will be required to produce material in a structured way and to present data using a range of formats including at least one table and one graph.

The candidate, in addition to presenting information graphically must also show that information can be interpreted from tables and graphs. For PC (e) the candidate must also answer four questions orally on the report. Answers should demonstrate an understanding of the concepts in the report.

For PC (d) the candidate must select an appropriate form in which to communicate information and must also interpret when presented with several pieces of information.

National unit specification: statement of standards (cont)

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For PC (f) the candidate should produce a short report explaining how group tasks were allocated, the strengths and weaknesses of own contribution and how he/she sought and provided support from and to others.

OUTCOME 2

Use algebraic formulae to calculate scientific quantities.

Performance Criteria

- a) Formulae are correctly stated.
- b) The substitution into formulae is correct.
- c) The calculation of quantities is correct.
- d) Answers are reported to an appropriate degree of accuracy and with correct units.

Evidence Requirements

Evidence of achievement of this outcome should be provided in written format to ensure that all the performance criteria have been met.

The evidence should be structured round specific tasks and must show that the candidate can use algebraic equations to calculate quantities. The candidate must use at least two algebraic formulae and must quote results to an appropriate degree of accuracy.

OUTCOME 3

Draw valid conclusions and use them to predict what might happen in similar situations.

Performance Criteria

- a) Valid conclusions are drawn and take account of factors which affect the quantities given in the data.
- b) The prediction of what might happen in similar situations is valid.

Evidence Requirements

Evidence of achievement of this outcome should be provided in written format to ensure that all the performance criteria have been met.

The evidence must show that the candidate can draw valid conclusions from data and make predictions of what might happen in a similar situation. The evidence can be in the form of two structured questions, where the candidate is given information with respect to the method of collecting data, the data and any other relevant factors so that he/she can evaluate the effectiveness of the task set and explain the relevance of the evidence used. The candidate should also produce a short report giving the conclusions drawn (and justified) from given information and make predictions on what might happen in a similar situation. The report should refer to the evidence gathered in Outcome 1 or from some other source.

National unit specification: support notes

UNIT Science in Context 2 (Intermediate 2)

This part of the unit specification is offered as guidance. None of the sections of the support notes is mandatory.

GUIDANCE ON CONTENT AND CONTEXT

Teachers/lecturers are encouraged to select and negotiate contexts appropriate to the needs of candidates and to the resources available.

A list of possible procedures is given below:

Biology

- 1 Setting up a microscope to view a prepared slide.
- 2 Slide preparation of living/biological material.
- 3 Separating biological material by centrifuging.
- 4 Preparation of sterile equipment and media.
- 5 Transferring living material from different containers without contamination or loss of material.
- 6 Chromatography to identify an unknown substance.
- 7 Use of dissection instruments with plants.
- 8 Use of probes and/or meters to monitor one or more of the following variables: pH, temperature, oxygen concentration, light.

Chemistry

- 1 Preparation of standard solution to a calculated molarity in the order of 0.1M (0.1 mol l^{-1}) or 0.05M (0.05 mol l^{-1}).
- 2 Titration (concordant to 0.1 cm^3)
- 3 Measurement of pH of a series of solutions using a pH meter.
- 4 Identification of an unknown substance using simple melting point measurement.
- 5 Chromatography to identify an unknown substance.
- 6 Refluxing and distillation.
- 7 Experimental determination of the percentage yield of a product.
- 8 Solvent extraction.
- 9 Recrystallisation.
- 10 Quantitative analysis using a spectrometer.

National unit specification: support notes (cont)

UNIT Science in Context 2 (Intermediate 2)

Physics

- 1 Use of multimeter or ammeter/voltmeter (analogue or digital scales) in ac/dc circuits with only resistive components.
- 2 Use of a cathode ray oscilloscope for measurement of time intervals and voltage.
- 3 Use of spectrometer with prisms/diffraction gratings.
- 4 Op-amp applications.
- 5 Use of transistor as a switch and/or measuring device.
- 6 Use of thermistors/thermocouples to measure temperature.
- 7 Null deflection methods in electrical circuits.

GUIDANCE ON TEACHING AND LEARNING APPROACHES

A range of learning and teaching approaches within the candidate centred philosophy may be appropriate.

Practical procedures must be approved by the teacher/lecturer and due consideration should be given to safety at all times.

A resource based approach is likely to be the most flexible for this unit. Opportunities to use new technology should be considered. Resource material in the form of publications, audio-visual materials etc should be made available.

GUIDANCE ON APPROACHES TO ASSESSMENT

During the work of the unit the candidate should have several opportunities to practise his/her skills. It is recommended that the tutor assesses the candidate at the stage where he/she is showing a consistent competence in a given task. Where a candidate is unsuccessful in achieving an outcome provision should be made for remediation and reassessment.

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 and Certification Arrangements* (SQA, 1998).