

National Unit Specification: General Information

UNIT Construction Measurement and Costing (Intermediate 2)

NUMBER D917 11

COURSE

SUMMARY

This unit is designed to help candidates develop skills in the basic measuring techniques required by those employed within the construction industry. It will also provide an introduction to the procedures adopted in determining the costs of construction materials. It is suitable for candidates possessing basic numeracy skills at access level 2 or 3 and it is envisaged that the unit will be studied in conjunction with other construction craft or technology units.

On completion of the unit, candidates should be able to use basic numeracy skills and common units of measurement to solve quantitative problems and to determine the costs of construction materials. They should also be able to use standard measuring equipment and techniques in a range of practical situations.

The unit will provide the basis for further studies in construction quantitative and costing procedures.

OUTCOMES

- 1 Use common units of measurement in solving quantitative problems.
- 2 Determine quantities by applying construction measuring techniques in practical situations.
- 3 Determine the costs of construction materials.

RECOMMENDED ENTRY

Candidates undertaking this unit do not require any prior experience in construction measurement, although possession of core skills in Using Number at Access 3 level would be beneficial.

Administrative Information

Superclass: TE

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CREDIT VALUE

0.5 Credits 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 Construction Measurement and Costing (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.

OUTCOME 1

Use common units of measurement in solving quantitative problems.

Performance Criteria

- a) Units of measurement for specified quantities are correctly identified.
- b) Numeric, length, area and volume quantities are correctly calculated.
- c) Mass quantities are correctly calculated.
- d) Conversion are used correctly to determine quantities expressed in the preferred units of measurement.

Note on range for the outcome

Quantities: numerical; length; area; volume; mass; mass/unit length; mass/unit area; mass/unit volume; volume/unit area.

Evidence Requirements

For this outcome, written and/or oral evidence is required that the candidate:

- i) has a sound knowledge of the appropriate units of measurement for each of the quantities of the note on the range;
- ii) can use correct notation and procedures to determine numerical, length, area, volume, and mass quantities and can express such quantities in the preferred units.

Realistic problems should be used in assessment and these should be set in at least three separate construction craft or technology contexts.

An understanding of the prefixes milli (m) and kilo (k), and the ability to convert one unit of measurement to another, should be demonstrated by the evidence.

Calculations may be carried out mentally, in writing or by calculator but all key operations in calculations should be recorded.

Assessment should be 'closed book'.

National unit specification: statement of standards (cont)

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OUTCOME 2

Determine quantities by applying construction measuring techniques in practical situations.

Performance Criteria

- a) Appropriate measuring equipment is selected for given tasks.
- b) Measuring equipment is correctly used and cared for.
- c) Measuring techniques are applied correctly and to acceptable standards of accuracy.
- d) Measurements are accurately recorded.
- e) Quantities required for costing purposes are correctly calculated.

Note on range for the outcome

The range statement for this outcome is fully expressed within the performance criteria.

Evidence Requirements

For this outcome, performance and written/oral evidence is required that the candidate can:

- i) select, use and care for the appropriate measuring equipment for a number of practical tasks;
- ii) apply measuring techniques to acceptable standards of accuracy;
- iii) record and use the measurements taken to determine quantities required for costing.

As with outcome 1, problems used in assessment should be based on at least three separate craft or technology areas.

Assessment should be 'open book'.

OUTCOME 3

Determine the costs of construction materials.

Performance Criteria

- a) Appropriate cost data are selected and used in material costing problems.
- b) Material costs are correctly calculated.

Note on range for the outcome

Costs: financial; gross; net; discount; VAT.

Evidence Requirements

For this outcome, written and/or oral evidence is required that the candidate can make use of published cost data to determine the final cost of materials, after taking account of discounts and VAT.

The costing problems used in assessment should be set in at least three separate construction craft or technology contexts. The problems used should preferably be based on the assessment problems of outcomes 1 and 2.

National unit specification: statement of standards (cont)

UNIT Construction Measurement and Costing (Intermediate 2)

Calculations may be carried out mentally, in writing or by calculator but all key operations in calculations should be recorded.

Assessment should be 'closed book' but with access to published cost data.

National unit specification: support notes

UNIT Construction Measurement and Costing (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

This unit is designed to provide candidates with the underpinning knowledge and the skills required to measure construction elements and to determine quantities and costs of materials.

Corresponding to outcomes 1 to 3:

- 1 This outcome should provide the candidate with a knowledge of the units of measurement used for a range of quantities. The quantities and units covered should include the following:

| Quantity | Units | | |
|----------------------------|-----------------------|------------------|-------|
| Number | no | | |
| Length | mm | m | |
| Area | mm ² | m ² | |
| Volume | mm ³ | m ³ | litre |
| Mass | g | kg | tonne |
| Mass/unit length | kg/m | t/m | |
| Mass/unit area | kg/m ² | t/m ² | |
| Mass/unit volume | kg/m ³ | t/m ³ | |
| Volume/unit area (liquids) | litres/m ² | | |

The use of prefixes such as milli (m) and kilo (k) should be covered, along with the method of converting a calculated unit of measurement to another. This will enable the candidate to adjust the unit of a particular measurement to the unit or scale preferred by the industry.

- 2 This outcome should provide the candidate with the skills to select the appropriate measuring equipment for a range of vocational tasks and to apply measuring techniques to achieve an appropriate degree of accuracy. The outcome should cover at least three separate construction vocational areas and the equipment used in each should be covered. The equipment covered should include the following:

- 1m folding boxwood rule
- Steel rules
- Winding and retractable steel tapes of various lengths
- Nylon tapes of various lengths
- Scale rule

National unit specification: support notes (cont)

UNIT Construction Measurement and Costing (Intermediate 2)

The measuring techniques used in each of the vocational areas included should be covered, along with the care of equipment and the means of avoiding errors in measurement and achieving the standards of accuracy normally expected.

- 3 This outcome should provide the candidate with the ability and confidence to take the quantities determined by calculation in outcome 1, and by measurement in outcome 2, and to apply cost data in determining material costs. Industry practice in the use of discounts, the application of VAT and the issuing of invoices should be covered. The sources of cost data considered should include published price books, manufacturers' and building suppliers' catalogues. As with outcomes 1 and 2, the outcome should cover at least three separate craft or technology areas.

GUIDANCE ON TEACHING AND LEARNING APPROACHES

When commencing this unit, many candidates will not have decided which career route, within the construction industry, to pursue. As required by the statement of standards and as mentioned in the foregoing section on context and context, delivery and assessment should be based on at least three craft or technology areas. This will be in the best interests of candidates as they move into employment within the industry.

Quantitative studies and construction costing are increasingly important in the competitive construction environment at large company level, but also for the small building companies in which many candidates will find employment. The importance of accurate measurement and costing at all levels, including the one person business, should be stressed early and throughout delivery of the unit.

Practical situations, in which quantitative measurements and calculations are required, should be considered throughout delivery of the unit. With outcome 1, tutorial exercises based on sketches of construction elements or drawings of real buildings could provide the basis of teaching and learning. For outcome 2, measurement techniques could be practised within the workshops and other accommodations of the centre. Candidates could also be encouraged to measure elements and materials within their own homes and to report on the results.

National unit specification: support notes (cont)

UNIT Construction Measurement and Costing (Intermediate 2)

The following list provides examples of elements and materials on which the work of the unit may be based:

| Quantity | Application |
|-----------------|---|
| Number of: | Fixings Pipe clips Wall ties Bricks/block Joist struts Rolls of wall paper Sheets of plasterboard |
| Length of: | Joinery facings Plastic, copper and drainage pipe DPC materials |
| Area of: | Sites Roofing and flooring products Walling Plasterboard Insulation board Decorative products Flashings |
| Volume of: | Excavations Foundation concrete Mortar Water storage systems Decorative and preservative products Timber |
| Mass of: | Excavations Concrete Aggregates Beams and joists Flooring products |

The teaching and learning of outcome 3 should ideally be integrated with that of outcomes 1 and 2. Costing calculations could then be carried out for the quantities determined for outcomes 1 and 2. Candidates should be encouraged to become familiar with the costing data presented in price books and in manufacturers' and building suppliers' catalogues.

National unit specification: support notes (cont)

UNIT Construction Measurement and Costing (Intermediate 2)

To provide automatic certification of the core skill Using Number at Intermediate 1 level, it will be necessary to ensure that calculation required of candidates involve the use of whole numbers, decimals, percentages, fractions, simple ratios and simple formulae expressed in symbols. Candidates should be encouraged to carry out certain simple calculations mentally. Calculations involving a number of operations should be in written form, with each operation clearly identified. Skills should be developed in the use of a calculator.

GUIDANCE ON APPROACHES TO ASSESSMENT

Examples of suitable Instruments of Assessment are provided below. These will ensure considerable integration of assessment across the three outcomes of the unit.

Instrument of Assessment No. 1

Short 'closed book' question paper covering outcome 1.

Candidates could be set a series of questions requiring them to:

- i) state the alternative units of measurement for a number of quantities;
- ii) identify practical situations in which the determination of specified quantities would be required;
- iii) explain the meaning of a number of unit prefixes;
- iv) carry out a number of unit conversions.

Instrument of Assessment No. 2

Short 'closed book' assignment covering outcome 1.

Candidates could be presented with sketches or drawings covering three separate construction vocational areas, and be required to complete a number of quantitative calculations.

Instrument of Assessment No. 3

Short practical assignment covering outcome 2.

Candidates could be required to complete and record a series of measurements covering three vocational areas and to determine quantities for costing. Worksheets could be provided and a checklist used to record the selection and use of equipment.

National unit specification: support notes (cont)

UNIT Construction Measurement and Costing (Intermediate 2)

Instrument of Assessment No. 4

Short assignment covering outcome 3. 'Closed book' with access to cost data.

Candidates could be required to use the calculated quantities of Instruments of Assessment 2 and 3 to determine the costs of materials. Discounts and VAT would be included in the calculations.

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).