



NUMERACY
SCQF Level 6
40 Hour Unit

CORE SKILLS UNIT

ASSESSMENT SUPPORT PACK

Part 1: Information for tutors

What is involved?

Numeracy at SCQF level 6 is about applying numerical skills in personal, workplace, social and educational situations which involve graphical information and calculations. The focus of the Unit is on transferable numeracy skills:

- ◆ using number skills
- ◆ understanding tables, charts and diagrams
- ◆ producing tables, charts and diagrams

The Unit is designed for delivery in schools, colleges, workplaces, community and other learning environments.

At this level, learners will be working with a wide range of numerical or statistical skills and complex graphical forms.

Learner motivation can be maximised by making the numeracy activities as relevant as possible to the learner's likely uses for numeracy. The activities should be drawn from the learner's personal, workplace, social or educational situation. Additionally, integration of the numeracy activities with those of other SQA qualifications being undertaken should be explored. For example, when a learner is undertaking other National Qualifications, motivation for numeracy can be increased if the activities are related to these National Qualifications and the learner can see the direct relevance of the numeracy. If you do decide to adopt this approach, separate records of assessment decisions must be kept for this Unit and evidence for this Unit should be clearly accessible.

Assessment and evidence

You should try to identify naturally-occurring opportunities for assessment where possible. For learners who are also working towards vocational Units or subject specific Units, opportunities for assessment of graphical or numerical skills could arise while completing tasks which provide evidence for both the vocational/subject specific Unit and this Unit. Some of the exemplars in this pack could be used or contextualised for this purpose.

Assessment is likely to be by one or more of:

- ◆ written tasks
- ◆ oral questioning
- ◆ observation

Assessment of the Unit should be based as far as possible on the everyday activities of the learner. You can find guidance on suitable assessment activities in Part 2 of this pack.

When you are assessing by observation, it is essential to keep a detailed checklist. When you are assessing by oral questioning, you must keep a copy of the questions asked and the answers given.

All items of evidence must be signed and dated by you.

Part 3 of this pack supplies exemplar forms which you can use to record successful completion of each of the Unit tasks. You can sign and date these as the learner achieves each task to keep a record of the learner's progress.

Planning

You should work out where opportunities for meeting the standard are likely to arise. Where possible this should be built into the assessment process. You should discuss this assessment process with the learners so that they are quite clear about what is expected from them.

Guidance on the Unit

What learners need to know or be able to do

The Unit states that on completion the learners will know how to:

- ◆ analyse situations to identify relevant numerical data and relationships in order to solve problems
- ◆ decide which operations to carry out and in what order to solve a problem
- ◆ use numerical or statistical concepts (eg use of formulae to represent relationships in symbolic form; manipulation of numbers represented by symbols; application of statistical concepts such as standard deviation)
- ◆ extract, analyse and interpret information from complex graphical forms
- ◆ identify significant features in graphical information (eg patterns; scatter; discontinuities; rates of change) and interpret these in relation to the underlying variables
- ◆ select an appropriate graphical form and use it to communicate information

At the SCQF 6 level, learners will be able to work with a high degree of independence and initiative. They will work with tasks set in unfamiliar situations where preliminary work needs to be done on gathering information and clarifying relationships between different pieces of information.

You can break the Unit down into two areas:

- ◆ using number
- ◆ using graphical information

These two areas are explained individually below and additional information from the Unit is included.

Using number

The Unit assumes that the learners have the basic numeracy skills of:

- ◆ notation for and use of whole numbers, decimals, percentages, fractions and ratios
- ◆ scientific notation
- ◆ basic arithmetic operations
- ◆ rounding answers to specified numbers of decimal places/significant figures
- ◆ positive and negative numbers

You do not have to assess these directly.

The types of numeracy tasks will depend on the learner's environment. However one or more of the following areas is expected to be involved:

- ◆ statistical concepts, eg standard deviation
- ◆ relationships in symbolic form
- ◆ re-arranging formulae
- ◆ creating a model of the situation

An activity does not need to include all of the above and any one learner does not have to successfully complete activities covering all of the above.

Suitably complex numerical tasks will consist of several stages. Some of the stages may require more than one numerical calculation. Learners may have to carry out preliminary work in identifying the relevant information and defining relationships within it.

For a single activity covering this part of the Unit, the learners might need to carry out calculations of standard deviation for two or more populations. Similarly in a financial activity, several scenarios would need be calculated out and allow comparisons to be drawn, to satisfy this part of the Unit with a single activity.

You should note the following general points from the Unit. The learners:

- ◆ can carry out the calculations mentally, in writing, using a calculator or using another electronic device eg a computer
- ◆ are allowed to give exact or approximate answers as appropriate
- ◆ are encouraged to check their answers, although evidence of this checking is not required

Regarding the final point, you should encourage the learners to think of ways to make a check on their numeracy calculations. It is not strictly part of the assessment but it is important that the learners have some confidence in their own calculations. This can be reinforced during feedback sessions following unsuccessful completion of assessments.

At the SCQF 6 level, learners must have wide-ranging experience of using graphical information. They should be familiar with the common types of tables, graphs, charts and diagrams in everyday use. The learners must be able to create these graphical forms and know the appropriate applications for them. Evidence of this for all of the graphical forms is not required.

However, a detailed knowledge is required of at least **one** type of complex graphical form. The learners must decide themselves on the appropriate graphical form to be used when representing information.

Learners can create or complete the graphical forms by hand or using computer software, so long as they understand the underlying concepts. You may want to check this by questioning them.

When exploring information presented graphically, the learners are expected to analyse and interpret the information (eg qualitative graphs; graphs where part of the axis has been omitted; histograms; graphs showing concepts/relationships such as cumulative frequency or complex variables; interpolation and extrapolation) This is likely to be the case when the learners have to make multiple readings from one or more graphical forms and then have to carry out further calculations.

As an indication of the complexity of the graphical forms the learners have to inspect, the activities might involve the following:

- ◆ qualitative graphs
- ◆ patterns
- ◆ scatter
- ◆ discontinuities
- ◆ rates of change

Another possible feature is where graphical forms have been employed to partly disguise the information. This can occur when axis scales have been manipulated. Similarly, data points may have been chosen to give an over-optimistic picture (eg choosing very specific year-end points to show misleading yearly financial results).

Gathering evidence

It may be appropriate for you to gather written evidence produced by the learners while carrying out the practical activities. However, written evidence is not essential for this Unit and is inappropriate if it disadvantages the learners. You may wish instead to use oral questioning. This requires you to create and complete record sheets comprising a checklist, questions asked and learner responses.

From the learner's point of view, it is very useful to be provided with a means of keeping all the work relevant to this Unit together. You can help here by creating and providing the learner with a workbook which includes all the evidence gathering items. An alternative is to provide worksheets which can be made into a paper-based or e-portfolio.

If you have chosen to integrate the numeracy work with that of other Units being undertaken by the learner, it may be possible to assess the numeracy as part of a larger single activity. In this case you must keep separate records for this Unit.

The Unit requires learners to carry out numeracy tasks related to their environment which involve:

- ◆ using numbers, carrying out calculations and drawing conclusions from the answers
- ◆ creating, extracting, analysing and interpreting information from tables, graphs, charts or diagrams

This may be achieved in many ways. Some typical activities might be:

- ◆ using data on size variations, on a random sample of products, to calculate 95% confidence limits, on the mean weight of the products
- ◆ researching and comparing local and national data on children's health
- ◆ comparing 5 year returns on a series of cash and stock market investment products
- ◆ using a population growth chart to forecast need for secondary school places
- ◆ reading weather maps to make decisions as to whether to postpone a planned sailing outing
- ◆ producing a series of charts to demonstrate staff turnover rates for jobs requiring different entry qualifications

It is possible that you could create a single activity which would provide evidence for the whole Unit. If this is not the case, or you do not think it to be appropriate for your learners, the assessment could be split into two tasks. These would be:

- ◆ Task 1: Numerical calculations
- ◆ Task 2: Graphical information

Part 2: Assessment Guidance

You can use the information given in this section in several ways:

- ◆ to help identify the type and amount of evidence which the learner needs to produce
- ◆ to help identify the level of complexity in evidence required for the Core Skill at this level
- ◆ to help you to create an assessment task related to the learner's own situation.

You can use the following information to create task sheets to be used with the learners in assessment sessions. The task sheet will contain the assessment items and you can leave appropriate space for the learners to insert their responses.

Learners must complete both of the tasks.

Task 1 Is designed to cover numerical calculations. Successful completion should be noted on the checklist. The Framework states that learners should carry a number of sustained complex calculations. A minimum of four will demonstrate consistent performance.

Task 2 Covers extracting and conveying information using graphical forms. Successful completion should be noted on the checklist.

Task 1: Numerical calculations

This task covers the Unit requirements to:

- ◆ analyse situations to identify relevant numerical data and relationships in order to solve problems
- ◆ decide which operations to carry out and in what order to solve a problem
- ◆ use numerical or statistical concepts (eg use of formulae to represent relationships in symbolic form; manipulation of numbers represented by symbols; application of statistical concepts such as standard deviation)

Four questions must be completed successfully.

Examples from the four areas are given in the following pages.

Personal/Social Context

- 1** Negative equity — a motor car can be purchased by means of a loan repaid over one, three, five or seven years. Given a purchase price, interest rates, and depreciation rate for the car, compare the depreciated value of a motor car with the sum owed for each year of each of the repayment periods. Find out if at any point the sum still owed is more than the value of the car.
- 2** Comparison of savings accounts interest rates — you wish to invest £1000 for a period of five years with interest re-invested. You have the choice of three products: one has a fixed interest rate of 5.50%; the second has an introductory interest rate of 6.50% for the first year and then is set at 5.00%; the third has a rate of 3% in the first year, increasing by one percent each year to 7% in the final year. Which product will give the greatest return at the end of the five years? This question requires use of the compound interest formula.
- 3** Healthy living — a large amount of data is available for people who have lived in city tenements over the past thirty years. This data relates to the age at death of the residents and which floors of the tenements they lived on. Process this data and investigate the correlation between floor lived on and longevity.
- 4** Safety awareness — a display on safe breaking distances for cars is to be produced. An appropriate formula has to be used to calculate the breaking distance for an average motor car from 50, 40, 30, 20 and 10 miles per hour, under both dry and wet surface conditions.

Educational Context

- 1 Analysis of experimental results involving two variables. The experiment yields ten data points. It is suspected that there is a linear relationship between the two variables. Explore this relationship by calculating the correlation co-efficient from the results.
- 2 Projectile motion — a calculation using the appropriate equation to determine terminal velocity.
- 3 Population study — using simple models for population growth, compare the outcomes after a period of ten years for each of two scenarios with varying reproduction rates, immigration into and migration from the country.
- 4 Electronic circuit — analysis of a passive circuit consisting of several loops. An alternative is the analysis of a circuit involving at least one transistor.

Workplace Context

- 1 Depreciation of fixed assets — using the depreciation formula and given depreciation rates and purchase price, calculate in which year the assets will be worth a particular fraction of their purchase price.
- 2 Quality control — the weights of ten samples from each of three identical production lines are recorded. Statistical methods are to be used to find the mean weight and standard deviation for the samples from each production line. The performance of the three lines is to be compared with reference to target product weight and the spread observed.
- 3 Effect of advertising — data is available on advertising spend and sales of product on three products for the past seven years. Use the data to investigate the correlation between sales and advertising spend.
- 4 A calculation involving a formula such as Bernoulli's Equation.

Task 2: Graphical information

This task covers the Unit requirements to:

- ◆ extract, analyse and interpret information from complex graphical forms
- ◆ identify significant features in graphical information (eg patterns; scatter; discontinuities; rates of change) and interpret these in relation to the underlying variables
- ◆ select an appropriate graphical form and use it to communicate information

One communicating and one interpreting question must be completed successfully.

Personal/Social Context

Interpret – a scatter diagram has been drawn up for males at each of the four ages (25, 35, 50 and 65 years) relating annual income to educational attainment. Information is to be extracted to investigate the effect of educational attainment and income at various stages in life. The calculation part of this could be used as one of the questions in Task 1.

Communicate — a graphical form has to be chosen and completed to illustrate the findings in the following question from Task 1:

Safety awareness — a display on safe breaking distances for cars is to be produced. An appropriate formula has to be used to calculate the breaking distance for an average motor car from 50, 40, 30, 20 and 10 miles per hour, under both dry and wet surface conditions.

Educational Context

Interpret — a set of UK maps giving regional information on income, house prices, car ownership and incapacity benefit uptake is available. Make a comparison of the regions by analysing these maps.

Communicate — given the characteristic values for an op-amp, draw up a diagram of a suitable circuit to give a voltage gain of 50.

Workplace Context

Interpret — a set of graphical forms are provided which have been designed to paint a rosy picture on the sales made by a company department. Analyse these and describe the true picture.

Communicate — a flow chart is to be created to illustrate a workshop procedure for newcomers. This would need to be of a complexity requiring several processing points and some conditional looping.

As well as retaining the learner task sheets with attached documentation, it will be useful to question the learners as they progress through the activities.

The learners must complete both activities successfully to achieve the Core Skill.

The evidence retained will be your checklist as will the learner task sheets and documentation.

Part 3: Exemplar recording documentation

This section provides sample forms which can be used by the learners and tutor to gather evidence and record assessment decisions.

If you have created task sheets, as described in Part 2, they can be used as an assessment record sheet to be completed by the learner directly or used by you to note the result of the discussions with the learner.

There is an assessment checklist for each of the tasks to be completed, signed and dated by you.

The final form is a summary checklist recording Unit progress to be completed, signed and dated by you.

Assessment checklists

Learner:			
Task 1: Numerical calculations			
<ul style="list-style-type: none"> ◆ analyse situations to identify relevant numerical data and relationships in order to solve problems ◆ decide which operations to carry out and in what order to solve a problem ◆ use numerical or statistical concepts (eg use of formulae to represent relationships in symbolic form; manipulation of numbers represented by symbols; application of statistical concepts such as standard deviation) 			
Activity	Achieved (tick)	Evidence	Tutor initials and date
1			
2			
3			
4			
Date of completion:		Tutor signature:	

In the evidence column, indicate how the activity meets the requirements stated. All four activities must be completed successfully.

Learner:			
Task 2: Graphical information			
<ul style="list-style-type: none"> ◆ extract, analyse and interpret information from complex graphical forms ◆ identify significant features in graphical information (eg patterns; scatter; discontinuities; rates of change) and interpret these in relation to the underlying variables ◆ select an appropriate graphical form and use it to communicate information 			
Activity	Achieved (tick)	Evidence	Tutor initials and date
1			
2			
Date of completion:		Tutor signature:	

In the evidence column, indicate how the activity meets the requirements stated.

Summary checklist

Learner:		
Learner number:		
Centre:		
Task	Date achieved	Tutor signature
1: Numerical calculations		
2: Graphical information		

Part 4: Information for learners

As you work through this Unit, your tutor will need to gather evidence to prove that you have demonstrated all the numeracy skills.

This can be done by:

- ◆ your tutor asking you questions
- ◆ you carrying out a written task
- ◆ your tutor observing you

By the end of the Unit you must show that you can:

- ◆ analyse situations to identify relevant numerical data and relationships in order to solve problems
- ◆ decide which operations to carry out and in what order to solve a problem
- ◆ use numerical or statistical concepts (eg use of formulae to represent relationships in symbolic form; manipulation of numbers represented by symbols; application of statistical concepts such as standard deviation)
- ◆ extract, analyse and interpret information from complex graphical forms
- ◆ identify significant features in graphical information (eg patterns; scatter; discontinuities; rates of change) and interpret these in relation to the underlying variables
- ◆ select an appropriate graphical form and use it to communicate information

These are some of the things you might do to provide the evidence:

- ◆ using data on size variations, on a random sample of products, to calculate 95% confidence limits, on the mean weight of the products
- ◆ researching and comparing local and national data on children's health
- ◆ comparing 5 year returns on a series of cash and stock market investment products

- ◆ using a population growth chart to forecast need for secondary school places
- ◆ reading weather maps to make decisions as to whether to postpone a planned sailing outing
- ◆ producing a series of charts to demonstrate staff turnover rates for jobs requiring different entry qualifications

Learners with disabilities and/or additional support needs

The additional support needs of individual learners should be taken into account when planning learning experiences, selecting the most appropriate assessment activity and considering any reasonable steps which might be necessary to allow the learner to meet the assessment standard.

Further advice can be found in SQA's Assessment Arrangements' web pages (www.sqa.org.uk)

ADMINISTRATIVE INFORMATION

Credit Value

1 Credit(s) at (SQA Level 12)
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