Unit Support Notes

Unit Support Notes — Numeracy (National 3)

Please refer to the note of changes at the end of this document for details of changes from previous version (where applicable).

Contents

Introduction

These support notes provide advice and guidance to support the delivery and assessment of the Numeracy (National 3) Unit. They are intended for teachers and lecturers who are delivering the Unit.

They should be read in conjunction with:

- the Unit Specification

Where the Numeracy (National 3) Unit is being undertaken as part of the National 3 Lifeskills Mathematics Course, these *Unit Support Notes* should also be read in conjunction with:

- the Course Specification
- the Course Support Notes
- appropriate assessment support materials

General guidance on the Unit

Aims

The Numeracy (National 3) Unit is a mandatory Unit in the National 3 Lifeskills Mathematics Course. The Numeracy Unit is also available as a free-standing Unit and is designed to meet the needs of a broad range of learners who may choose to study it.

The general aim of this Unit is to develop learners' numerical and information handling skills to solve simple, real-life problems involving number, money, time and measurement. As learners tackle real-life problems, they will use their knowledge and understanding of number processes, information handling and probability to make informed decisions.

Learners who successfully complete this Unit will be able to:

1 Use numerical skills to solve simple, real-life problems involving money/time/measurement
2 Interpret graphical data, and situations involving probability to solve simple, real-life problems involving money/time/measurement

In addition, learners will have the opportunity to develop generic and transferable skills for learning, skills for life and skills for work. These include numeracy and thinking skills.

Responsibility of all
All teachers/lecturers have responsibility for promoting the development of numeracy across learning. Numeracy, as a *Skill for Learning, Skill for Life and Skill for Work* is likely to be developed within a wide range of National Courses. Centres may wish to use these *Unit Support Notes* and the *Unit Specification* to ensure that all teachers/lecturers have a shared understanding of: the standards expected; how learners progress in numeracy; and of possible approaches to learning, teaching and assessment. Examples of cross-curricular approaches to Numeracy can be found in the section titled 'Approaches to learning and teaching'.

Progression into this Unit

Entry into this Unit is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by one or more of the following or equivalent qualifications and/or experience:

- National 2 Lifeskills Mathematics Course or its component Units

Prior learning, life and work experiences may also provide an appropriate basis for entry into this Unit. This could include relevant skills, knowledge and understanding and appropriate experiences and outcomes from the mathematics curriculum area. Examples of prior skills, knowledge and understanding that are particularly relevant are given in the *Course Support Notes*.

Centres wishing to establish the suitability of learners without prior qualifications and/or experiences and outcomes may benefit from carrying out a diagnostic review of prior life and work experiences. This approach may be particularly useful for adults returning to education.

Skills, knowledge and understanding covered in this Unit

Information about skills, knowledge and understanding is given in the National 3 Lifeskills Mathematics *Course Support Notes*.

This section provides further advice and guidance about skills, knowledge and understanding that could be included in the Unit. It should be read in conjunction with Appendix 1 of the National 3 Lifeskills Mathematics *Course Support Notes*. The following table outlines suggested content for each Assessment Standard within the Unit:

Outcome 1: Use numerical skills to solve simple, real-life problems involving money/time/measurement	
Assessment Standard	**Skills, knowledge and understanding**
1.1 Selecting and using appropriate numerical notation and units	♦ Numerical notation should include: =, +, –, ×, /, ÷, and decimal point ♦ Units should include: — money (pounds and pence) — time (months, weeks, days, hours, minutes) — measurement of length (millimetre, centimetre, metre, kilometre); weight (gram, kilogram); volume (millilitre, litre) and temperature (Celsius)
1.2 Selecting and carrying out calculations	♦ add and subtract whole numbers up to four digits ♦ multiply in context up to four-digit whole numbers with one or two digit whole numbers ♦ divide in context up to four-digit whole numbers with a single digit whole number ♦ round answers to at most two decimal places ♦ use simple percentages and fractions of shapes and quantities, eg 50%, 10%, 20% and 25%; ½, ¼, 1/10, 1/5 ♦ express numbers up to 10,000 in words and figures ♦ convert equivalences between simple fractions, decimal fractions and percentages
1.3 Recording measurements using a simple scale on an instrument	♦ use measuring instruments with simple scales to measure length, weight, volume and temperature ♦ read scales to the nearest marked, numbered division with a functional degree of accuracy ♦ centimetres to be measured to the nearest cm and for small objects, accuracy should be ±2 millimetres

1.4 Interpreting measurements and the results of calculations	♦ use appropriate checking methods, eg check sums and estimation ♦ interpret results of measurements involving time, length, weight, volume and temperature ♦ recognise the inter-relationship between units in the same family, eg mm/cm, cm/m, g/kg, and ml/l ♦ use vocabulary associated with measurement to make comparisons for length, weight, volume and temperature
1.5 Making decisions based on the results of measurements and calculations	♦ make simple decisions; an explanation is not required
Outcome 2: Interpret graphical data, and situations involving probability to solve simple, real-life problems involving money/time/measurement	
2.1 Extracting and interpreting data from at least one simple graphical form	Simple graphical forms should include: ♦ a table with at least three categories of information ♦ a chart such as a bar chart or pictogram ♦ a graph such as a single line graph where the scale is obvious ♦ a diagram such as a 2D plan
2.2 Making decisions based on the interpretation of data	♦ make decisions based on observations of data ♦ make decisions based on calculations involving data ♦ make decisions based on reading scales
2.3 Making decisions based on probability	♦ use data to state the likelihood of an event happening ♦ make decisions based on likelihood ♦ use the probability scale

Content and contexts which are used in the teaching of this Unit are at the discretion of the centre. Content and contexts must however, provide evidence of all Outcomes and Assessment Standards in the Unit.

At this level contents and contexts for the development of skills, knowledge and understanding are likely to be basic. This may include for example, contexts that are familiar and relevant to the daily life of the learner. Problems at this level should be clear and typically involve only one or two stages. Learners at this level are more likely to require support to interpret the problem.

If this Unit is being delivered on a free-standing basis, teachers and lecturers are free to select the skills, knowledge, understanding and contexts which are most appropriate for delivery in their centres.

Progression from this Unit

This Unit may provide progression to:

- Numeracy (National 4) Unit
- Core Skills: Numeracy (SCQF level 4)
- other Units within the National 3 Lifeskills Mathematics Course
- component Units of the Personal Finance Award (SCQF level 4)
- further study, employment and/or training

Numeracy has applications in a variety of subject areas including life and work. The skills, knowledge and understanding developed in this Unit could support both breadth and depth of learning in other curriculum areas in addition to life and work contexts.

The Numeracy Unit at National 3 is in a hierarchy with the Numeracy Units at National 4 and National 5. This hierarchical structure aims to facilitate progression, provide a mechanism for fall back and to enable learners to be given recognition for their best achievement. This hierarchical relationship and skills development across the levels is shown in Appendix 1.

Approaches to learning and teaching

The purpose of this section is to provide general advice and guidance on approaches to learning and teaching for this Unit.

There are a variety of learning and teaching approaches which can be used to deliver this Unit. This section of the *Unit Support Notes* provides advice and guidance and includes examples of some approaches that could be used.

The advice and guidance in this section has been developed for a range of educational settings. Teachers/lecturers should use their professional judgement and opportunities for personalisation and choice when designing and delivering the Unit so that it is relevant and motivating for learners.

Effective learning and teaching will draw on a variety of approaches to enrich the experience of learners. In particular, a mix of approaches which provide opportunities for personalisation and choice will help to motivate and challenge learners. Some of these approaches include: interdisciplinary learning; cross curricular opportunities; investigations/problem solving approaches; individual and collaborative work and resource-based learning.

Examples of these approaches for this Unit are outlined below:

Interdisciplinary learning: could be used to develop numeracy through scheduled or special events which take place throughout the year, for example:

- Trade fairs or sponsored events which could involve learners managing money and data. For example, recording and interpreting data for sponsored events or fundraising activities.
- Shows, exhibitions and plays could be used as contexts to manage money collected from ticket sales and working out the costs of production. Learners could also be involved in the timing of the events.
- Sports days could be used to manage data by recording results. These results could then be presented in graphical form and interpreted as part of a write up following the event.
- Visiting speakers or external visits could highlight where and how numeracy is applied in the workplace. This could include retail outlets, construction companies and energy providers.
- School trips, excursions, voluntary work or work experience opportunities could be used to apply numerical skills in contexts such as outdoor education centres, visits to museums, and work attachments to local companies.

Cross-curricular opportunities: topics, themes or team teaching could be used to build on the strong relationship between numeracy and other curriculum areas. The examples below could be adapted for use in other curriculum areas as opportunities to develop numeracy across learning:

Curriculum area	Possible cross-curricular learning and teaching links
Technologies	♦ Applying skills and knowledge of measurement and units of measurement, measuring and marking out materials in accordance with working drawings. ♦ Reading and interpreting scales on instruments and carrying out associated calculations to design and make items, or to work with tools. ♦ Interpreting and calculating dimensions and scale in drawings/diagrams and applying them to work pieces. ♦ Manufacturing items to strict measurements.
Art	♦ Using knowledge of measurement to create pictures or patterns.
Geography	♦ Using numeracy on field trips or when working with maps. ♦ Learners could take measurements, carry out a range of calculations associated with measurement and interpret a range of graphical data such as weather charts. ♦ Using scale when measuring distance. ♦ Learners may also be asked to consider amounts of land taken up for particular purposes, eg housing, industry or recreation. ♦ Learners could observe and record geographical information. For example, using a tally chart to record field samples; or carrying out a traffic count at the school/college gates.
Health and wellbeing	♦ Using a range of measuring instruments such as scales, spoons, measuring jugs, timers and thermometers during cooking or when preparing food. ♦ Learners could also carry out a range of calculations when using recipes. ♦ Calculations could also be used to work out dietary requirements and understand food labelling. ♦ Learners could also work with lifestyle data to make choices associated about their own health and wellbeing. ♦ Undertaking a basic costing exercise to compare issues surrounding fresh versus convenience foods, or sourcing foods locally in season versus buying imported food.
Sciences	♦ Measuring and recording data collected during practical scientific experiments, learners could explore how data can be presented in different ways. ♦ Learners could be asked to carry out calculations associated with the data and interpret data to make decisions based on the results of these calculations and understanding the results. ♦ Science also involves an awareness and understanding of the chance of events happening.

Physical education	♦ Measuring physical achievements, recording and reporting results to others in graphical form. ♦ Learners could also combine their knowledge of numeracy, geography and physical education in orienteering activities.
Social Studies	♦ Exploring the use of numeracy in businesses. Learners could be involved in a small enterprise activity and have the opportunity to develop numerical skills associated with money and money management. ♦ Learners could also extract numerical information and present this in a prescribed layout which will enable decisions to be taken in business. This may take the form of a simple cash budget and/or cost statement.

Investigative/problem solving approaches may provide the opportunity for learners to observe, explore, experiment and discuss numerical approaches to solve real-life problems. For example, by asking 'what would happen if….?, learners could explore the concepts of probability including chance and uncertainty. This approach has the potential to stimulate thinking and develop the ability to identify strategies to solve numerical problems. This approach could be supported by questioning and/or discussion by using prompt questions such as: 'What did you do to work that out? Could this task or problem have been solved in a different way? If yes, what would you have done differently?

Individual and/or collaborative working could provide learners with the opportunity to 'think, pair, share' strategies for tackling real-life tasks. For example:

- Learners could be asked to work out how to solve a given problem. They could then share their ideas with others and agree on the best approach.
- Online tests, textbook exercises, quizzes or competitions could also be used to practise numerical skills and strategies, sharpen recall of number facts and develop efficient calculation strategies.
- Exposition is an important technique. However, learners should be engaged as much as possible. The engagement of learners working on their own could be enhanced by teachers/lecturers providing opportunities for personalisation and choice where appropriate.

Group work approaches can be used with Units and across Courses where it is helpful to stimulate real-life situations, share tasks and promote team working skills. However, there must be clear evidence to show that the learner has met the required Assessment Standards for the Unit or Course.

Resource-based learning could include for example:

- Using real-life or simulated environments to develop skills in managing money or time and in using measuring instruments.
- Using calculators, computers, tablets, mobile phones and other electronic devices to explore numbers, manage time, or check answers to calculations. The use of technology is particularly appropriate when this is a naturally occurring feature of the context in which learning is taking place. Calculators often help learners to process numbers, freeing up time for them to analyse

situations, draw conclusions and make informed decisions. However, learners should where possible be encouraged to develop and improve their skills in completing both written and mental calculations to develop numerical fluency and efficiency.

- Using real-life materials such as invoices, magazine articles, bills and adverts.

Combining and sequencing the delivery of Outcomes within the Unit

The combination of delivery and assessment of this Unit is entirely at the discretion of the centre. Two main approaches are suggested here, but other possibilities may exist:

Possible combinations	Suggested approaches
Outcomes 1 and 2 combined	In this approach, Outcomes 1 and 2 could be combined. Learners could be given the opportunity to use numerical skills to interpret graphical data and situations involving probability. This could involve learners selecting and using numerical notation, units, and calculations to manipulate and interpret data. Learners could also use the results of calculations to make decisions based on the interpretation of data. Assessment evidence could be collected at the end of the Unit.
Outcomes 1 and 2 delivered sequentially	In this approach, the two Outcomes could be delivered sequentially. This approach would allow for the development of number and number processing skills which can then be further developed and applied within Outcome 2. In this way basic numerical skills are reinforced and consolidated. Assessment evidence could be collected at the end of the Unit or during the delivery or at the end of each Outcome.

The National 3 Lifeskills Mathematics *Course Support Notes* provide further advice and guidance on generic approaches to learning and teaching which apply to all component Units of the Course

Examples of additional contexts for the learning and teaching of Numeracy can be found in Appendix 2.

Developing skills for learning, skills for life and skills for work

This Unit overtakes the requirements of Numeracy as described in SQA's *Skills for Learning, Skills for Life and Skills for Work* framework.

There are also significant opportunities to develop the following Thinking Skills as described in the table below:

SQA Skills for Learning, Skills for Life and Skills for Work framework definition	**Suggested approaches for learning and teaching**
Understanding is the ability to demonstrate the meaning of items of information, to explain the order of events in a sequence, and to interpret in a different setting or context.	This Unit will provide the opportunity for learners to develop and demonstrate their understanding of numeracy in real-life contexts. They will be able to select and apply appropriate numerical processes and interpret the results of measurements and calculations to make decisions. To determine a learner's level of understanding, learners could be encouraged to show and explain their thinking.
Applying is the ability to use existing information to solve a problem in a different context, and to plan, organise and complete a task.	Wherever possible, learners could be given the opportunity to apply the skills, knowledge and understanding they have developed to solve simple problems involving numeracy in a range of real-life contexts. Learners could be encouraged to think and talk about how they are going to tackle problems, decide which skills to use and then carry out the calculations or measurements to complete the task. To determine a learner's level of understanding, learners could be encouraged to show and explain their thinking.

There may also be further opportunities for the development of additional skills for learning, skills for life and skills for work in the delivery of this Unit. These opportunities may vary and are at the discretion of the centre.

Approaches to assessment

The purpose of this section is to give advice and guidance on approaches to assessment within this Unit.

A variety of approaches can be used to assess learners and gather evidence. The examples given here are not exhaustive.

Assessments must be valid, reliable and fit for purpose for the subject and should fit with the learning and teaching approaches adopted. Each assessment should therefore:

- be designed to allow learners to produce sufficient evidence to show they have achieved the required Outcomes and Assessment Standards for the Unit
- allow consistent judgements to be made
- be appropriate for the general aims of the Unit

Combining and sequencing the assessment of Outcomes within the Unit

The combination of delivery and assessment of this Unit is entirely at the discretion of the centre.

The pattern of combined assessment can mirror that for integrated delivery as suggested in the section on 'Approaches to learning and teaching'.

A combined approach to assessment has the advantage of:

- bringing together elements of different Outcomes and encouraging the transfer of skills, knowledge and understanding
- making learning and assessment more coherent and relevant for learners

Suggested approaches to assessment
The skills-based focus of the Unit readily lends itself to a variety of approaches to assessment.

The following table gives some suggested approaches to assessment and examples of how they could be used to combine assessment within the Unit.

Suggested assessment approach	**An example of how this approach could be used to combine assessment of Outcomes and Assessment Standards within the Unit**
Problem solving tasks or activities	**Example 1:** Using recipes to carry out measurements involving weight, capacity and temperature. All measurements should be metric. In conjunction with the Home Economics department learners could scale down a recipe so that they could each bake a cake or set of scones. They would then need to scale up the recipe so that they can work out the total amount of ingredients that the Home Economics department would need to order. Learners could then bake the cakes/scones and

	calculate the cost per cake or scone to cover the costs of the ingredients. They could operate a cake stall selling the produce at break time for charity, recording the transactions and making decisions about profit/loss. **Example 2:** Planning a trip abroad perhaps in conjunction with the Geography Department. In this example there is scope for the calculation of simplified foreign exchange rates, time zones, train/plane timetables, comparison of average temperatures, rainfall and hours of sunshine etc to make a decision about which would be the best destination to go to, based on a given budget.
Projects or Investigations	**Example 1:** Planning a re-modelling of the school car park involving measurement both of the available land and space per car. Creating scale drawings and making decisions regarding the best way to fit the cars in the car park. **Example 2:** Investigate probability by tossing coins, or predicting cards or the roll of dice. Discuss the implications of probability to real-life contexts such as health, accidents or winning events.
Case studies	**Example 1:** Using given data showing the costs for a mobile phone tariff. Calculate the monthly cost of the mobile phone, determining the affordability against a given budget. **Example 2:** Using a simplified utility bill, calculate daily, monthly and annual costs. Calculate the cost if the bill is shared among a number of residents and calculate the impact of a percentage increase in costs by the energy supplier.
Short/extended response tests	Short and extended response tests could be used to assess both Outcomes at the same time. Tests should build up in difficulty starting with simple short response questions at the start and finishing with more challenging extended response questions. Short response questions could be used to assess those Assessment Standards which focus on processing such as selecting and carrying out calculations and extracting and interpreting data. Extended response questions would lend themselves to the assessment of the reasoning assessment standards such as 'Making decisions based on the results of measurements and calculations' and 'Making decisions based on probability'.

Additional examples are provided in Appendix 2 'Examples of learning, teaching and assessment contexts'.

Whatever internal assessment method is used, teachers/lecturers are encouraged to be as inclusive as possible taking into account the needs and experiences of their learners. In particular, internal assessment should:

- use content, resources and materials that recognise different groups and avoid bias or stereotyping
- where possible, provide a balance of assessment methods and adopt alternative approaches to gather evidence which build in opportunities for personalisation and choice

Evidence must be generated for all Outcomes and Assessment Standards.

Teachers/lecturers should use their professional judgement to decide which approaches to assessment and contexts are appropriate for the learners and to make judgements about the sufficiency of the evidence produced.

Exemplification of assessment is provided in the *National Assessment Resource*.

Gathering evidence
Evidence for assessment purposes could take a variety of forms such as:

- written evidence including calculations and graphics generated during
- supervised class work or discrete mathematical tests
- oral evidence arising from discussion between learners and the teacher which shows learners' ability and understanding across the Assessment Standard
- computer-generated assessment records or printouts from simulations, eg SQA Solar or online tests
- photographs of project or investigative work
- a product which could be a spreadsheet or computer-generated graphic

This list is not exhaustive and other types of evidence are also possible.

Achievement is on a pass/fail basis for the Outcomes. Learners who fail to achieve all of the Assessment Standards within the Outcomes will only need to be re-assessed on those Assessment Standards not achieved. Centres may consider it appropriate to delay re-assessment until further learning has taken place. Opportunities may exist for this by building reassessment into assessment carried out in other Units.

Authentication
For guidance on authentication of evidence which is gathered outwith the direct supervision of the teacher/lecturer responsible for the learner, eg outside the school or classroom, refer to SQA's *Guide to Assessment.*

Equality and inclusion

It is important that where possible, inclusive approaches to learning and assessment encourage personalisation and choice for learners. The additional support needs of learners should also be taken into account when planning learning experiences and when considering any reasonable adjustments that may be required.

Any additional support provided to learners to help them access assessment tasks should maintain the integrity of the Outcomes and Assessment Standards.

Examples of support which may be appropriate for this Unit are as follows:

- practical helpers under direct learner instruction could assist with practical measurement activities (including a reader or scribe)
- adapted equipment would also be appropriate for measuring tasks
- the use of a calculator or similar aid
- ICT and other assistive technologies

Other types of support are also possible and would be determined by the teacher/lecturer in response to the specific needs of the learner.

It is recognised that centres have their own duties under equality and other legislation and policy initiatives. The guidance given in these *Unit Support Notes* is designed to sit alongside these duties but is specific to the delivery and assessment of the Unit.

Alternative approaches to Unit assessment to take account of the specific needs of learners can be used. However, the centre must be satisfied that the integrity of the assessment is maintained and that the alternative approach to assessment will, in fact, generate the necessary evidence of achievement.

Appendix 1: Reference documents

The following reference documents will provide useful information and background.

- Assessment Arrangements (for disabled candidates and/or those with additional support needs) — various publications on SQA's website: http://www.sqa.org.uk/sqa/14976.html
- *Building the Curriculum 4: Skills for learning, skills for life and skills for work*
- *Building the Curriculum 5: A framework for assessment*
- Course Specifications
- Design Principles for National Courses
- *Guide to Assessment* (June 2008)
- Overview of Qualification Reports
- *Principles and practice papers for curriculum areas*
- *Research Report 4 — Less is More: Good Practice in Reducing Assessment Time*
- *Coursework Authenticity — a Guide for Teachers and Lecturers*
- *SCQF Handbook: User Guide (published 2009)* and SCQF level descriptors (to be reviewed during 2011 to 2012): www.sqa.org.uk/sqa/4595.html
- *SQA Skills Framework: Skills for Learning, Skills for Life and Skills for Work*
- *Skills for Learning, Skills for Life and Skills for Work: Using the Curriculum Tool*
- SQA Guidelines on e-assessment for Schools
- SQA Guidelines on Online Assessment for Further Education
- SQA e-assessment web page: www.sqa.org.uk/sqa/5606.html

Appendix 2: Hierarchical progression

National 3 Numeracy	National 4 Numeracy	National 5 Numeracy
At National 3, problems should be simple and involve contexts that are familiar and relevant to the daily life of the learner. Problems should be clear and typically involve only one or two steps. It is likely that learners at this level will require support to interpret the problem.	At National 4, problems should involve straightforward contexts that frequently occur in daily life and are likely to be familiar to the learner. Problems should be clear and typically involve 2–3 operations. They are likely to involve more than two steps. Learners at this level may require additional supporting material to interpret the problem.	At National 5, problems should involve a range of contexts drawing from personal, social and vocational areas. These contexts may be unfamiliar to learners. A more analytical approach is expected at this level with problems typically involving sustained calculations and multiple steps. Learners at this level are likely to be more independent, but may rely on the use of calculators and other forms of technology to speed up numerical process and allowing them to focus on analysis and interpretation. Additional supporting material may also be required to support learners' to interpret the problem.
Outcome 1: Use numerical skills to solve simple, real-life problems involving money/time/measurement	**Outcome 1: Use numerical skills to solve straightforward, real-life problems involving money/time/measurement**	**Outcome 1: Use numerical skills to solve real-life problems involving money/time/measurement**
1.1 Selecting and using appropriate numerical notation and units: ♦ =, +, –, ×, /, ÷, and decimal point ♦ Units: — money (pounds and pence) — time (months, weeks, days, hours, minutes) — measurement of length (millimetre, centimetre, metre, kilometre); weight (gram, kilogram); volume (millilitre, litre) and temperature (Celsius)	1.1 Selecting and using appropriate numerical notation and units ♦ =, +, –, ×, /, ÷, <, >, ( ), %, colon and decimal point ♦ Units: — money (pounds and pence) — time (months, weeks, days, hours, minutes, seconds) — measurement of length (millimetre, centimetre, metre, kilometre, mile); weight (gram, kilogram); volume (millilitre, litre) and temperature (Celsius or Fahrenheit)	1.1 Selecting and using appropriate numerical notation and units ♦ =, +, -, x, /, ÷, <, >, ( ), %, colon and decimal point and simple formulae ♦ Units: — money (pounds and pence) — time (months, weeks, days, hours, minutes, seconds) — measurement of length (millimetre, centimetre, metre, kilometre, mile); weight (gram, kilogram); volume (millilitre, litre) and temperature (Celsius and Fahrenheit)

1.2 Selecting and carrying out calculations such as: ♦ add and subtract whole numbers to four digits ♦ multiply to four-digit whole numbers with one or two digit whole numbers ♦ divide to four-digit whole numbers with a single digit whole number ♦ round answers to two decimal places ♦ use simple percentages and fractions eg 50%, 10%, 20% and 25%; ½, ¼, 1/10, 1/5 ♦ express numbers up to 10,000 ♦ convert between simple fractions, decimal fractions and percentages	1.2 Selecting and carrying out calculations ♦ add and subtract whole numbers including negative numbers ♦ multiply whole numbers of any size, with up to four-digit whole numbers ♦ divide whole numbers of any size, by a single digit whole number as well as 10 and 100 ♦ round answers to the nearest significant figure or two decimal places ♦ find simple percentages and fractions of shapes and quantities, eg 50%, 10%, 20% and 25%, 33⅓%; ½, ⅓, ¼, 1/10, 1/5 ♦ calculate percentage increase and decrease ♦ convert equivalences between common fractions, decimal fractions and percentages ♦ calculate rate: eg km per hour or number of texts per month ♦ calculate distance given speed and time ♦ calculate time intervals using the 12 hour and 24-hour clock ♦ calculate volume (cube and cuboid), area (rectangle and square) and perimeter (shapes with straight lines) ♦ calculate ratio and direct proportion	1.2 Selecting and carrying out calculations ♦ add and subtract numbers given to two decimal places ♦ multiply or divide a number given to two decimal places by a single-digit whole number ♦ multiply or divide a number given to two decimal places by multiples of 10, 100 and 1000 ♦ round answers to the nearest significant figure or three decimal places ♦ find percentages and fractions of shapes and quantities ♦ recognise and use mixed fractions, eg 3½, ⅓, 4¼, 1/8, 2/6 ♦ add and subtract simple fractions, eg ½ + ¼ and ⅔ - ⅓ ♦ find the number of fractional parts in a mixed number, eg 2½ = 5 halves ♦ calculate compound percentage increase and decrease ♦ express a quantity as a percentage of another quantity ♦ convert equivalences between fractions, decimal fractions and percentages ♦ calculate speed, time and distance ♦ calculate volume (cylinder, triangular prism), area (triangles and composite shapes) and perimeter (circumference) ♦ calculate ratio including dimensions from scale drawings, eg scale of 1:10 ♦ calculate direct and indirect proportion

1.3 Recording measurements using a simple scale on an instrument ♦ measure length, weight, volume and temperature ♦ read scales to the nearest marked, numbered division ♦ Centimetres to be measured to the nearest cm and for small objects, accuracy should be ±2 millimetres	1.3 Recording measurements using a straightforward scale on an instrument ♦ measure length, weight, volume and temperature ♦ read scales to the nearest marked, unnumbered division	1.3 Recording measurements using a scale on an instrument ♦ measure length, weight, volume and temperature ♦ read scales to the nearest marked, minor, unnumbered division
1.4 Interpreting measurements and the results of calculations ♦ interpret results of measurements involving time, length, weight, volume and temperature ♦ recognise inter-relationship between units of the same family ♦ use vocabulary to make comparisons for length, weight, volume and temperature	1.4 Interpreting measurements and the results of calculations to make decisions ♦ interpret results of measurements involving time, length, weight, volume and temperature ♦ recognise inter-relationship between units in the same family ♦ use vocabulary to make comparisons for length, weight, volume and temperature	1.4 Interpreting measurements and the results of calculations to make decisions ♦ interpret results of measurements involving time, length, weight, volume and temperature ♦ recognise inter-relationship between units different families ♦ use vocabulary associated to make comparisons for length, weight, volume and temperature
1.5 Making decisions based on the results of measurements and calculations ♦ Make simple decisions; an explanation is not required	1.5 Explaining decisions based on the results of measurements and calculations ♦ Give reasons for decisions based on the results of calculations	1.5 Justifying decisions based on the results of measurements and calculations ♦ Using evidence from the results of calculations to justify decisions

Outcome 2: Interpret graphical data, and situations involving probability to solve simple, real-life problems involving money/time/measurement	**Outcome 2: Interpret graphical data, and situations involving probability to solve straightforward, real-life problems involving money/time/measurement**	**Outcome 2: Interpret graphical data, and situations involving probability to solve real-life problems involving money/time/measurement**
2.1 Extracting and interpreting data from at least one simple graphical form. Simple graphical forms should include: ♦ a table with at least three categories of information ♦ a chart such as a bar chart or pictogram ♦ a graph such as a single line graph where the scale is obvious ♦ a diagram such as a 2D plan	2.1 Extracting and interpreting data from at least two different straightforward graphical forms. Straightforward graphical forms should include: ♦ a table with at least four categories of information ♦ a chart where the values are given or where the scale is obvious, eg pie ♦ a graph where the scale is obvious, eg bar, pie, scatter or line graph ♦ a diagram, eg stem and leaf, map or plan	2.1 Extracting and interpreting data from at least three different graphical forms: ♦ a table with at least five categories of information ♦ a chart where all the values are not given or where the scale is not obvious, eg comparative/compound bar chart ♦ a graph where part of the axis is missing or the scale is not obvious, eg conversion line graph ♦ a diagram, eg stem and leaf, scatter diagram or a map
2.2 Making decisions based on the interpretation of data ♦ make decisions based on calculations ♦ make decisions based on reading scales	2.2 Making and explaining decisions based on the interpretation of data from straightforward graphical forms ♦ make decisions based on calculations ♦ make decisions based on reading scales ♦ offer reasons for decisions made based on the interpretation of data	2.2 Making and justifying decisions using evidence from the interpretation of data from graphical forms ♦ make decisions based on patterns, trends or relationships in data ♦ using evidence from the interpretation of data to justify decisions ♦ understand the effects of bias and sample size

2.3 Making decisions based on probability ♦ use data to state likelihood of an event happening ♦ make decisions based on likelihood ♦ use the probability scale	2.3 Making and explaining decisions based on probability ♦ make predictions and use these predictions to make and explain decisions ♦ make predictions and use these predictions to make decisions ♦ use relative frequencies, contingency tables and describe probability through the use of percentages, decimals and fractions to make and explain decisions	2.3 Making and justifying decisions based on probability ♦ recognising patterns, trends and relationships and use these to state the probability of an event happening ♦ using evidence from the interpretation of probability to justify decisions ♦ analysing the probability of combined events, identifying the effects of bias and describing probability through the use of percentages, fractions decimals and ratio to make and justify decisions

Appendix 3: Examples of learning and teaching contexts

This Appendix provides some examples of the contexts that could be used to develop and assess the Numeracy (National 3) Unit. These examples are not exhaustive. Additional exemplification can be found in the *National Assessment Resource*.

Outcome 1: ***The learner will use numerical skills to solve simple, real-life problems involving money/time/measurement.***

1. Measurement activities both practical and theoretical can be carried out using a variety of real-life contexts. This can include counting squares or carrying out simple calculations. Examples of topics could include: DIY, cooking, sport and recreation. Learners should be aware that exact measurements are not always possible and that the level of accuracy is often dependent on the measuring instrument and the nature of the task. A suitable scale is one where the numbered major divisions are clearly marked. Learners must be able to measure to the nearest marked, numbered division.

2. Using recipes and appropriate measuring instrument to carry out measurements involving weight, capacity and temperature. All measurements should be metric.

3. Estimating the length of time taken for a journey when given the speed and the distance to be travelled.

4. Using a utility bill for shared student accommodation; calculate cost of electricity per month for the whole house. Then calculate the cost per person if the bill is shared among a number of resident students.

5. Calculating the total cost of a shopping trip involving a number of items. Fractions could be introduced if the cost of the bill is shared between two friends, ie what is half of the total bill?

6. Record the number of ‘hits’ on a website per day over a period of a month. Calculate the average number of hits and predict which days in subsequent months will see the most hits.

7. Reading a given table showing costs for a mobile phone tariff. Calculating the monthly cost of the mobile phone, determining the affordability against a given budget.

8. In woodworking, calculate the amount of wood required to build a bird feeder by measuring out the component parts.

9. Provide an estimate for creating a ‘built-in wardrobe’ and/or other pieces of storage furniture (eg blanket box for sitting on). This may involve designing the piece of furniture (cross curricular opportunity with CDT/Art), Scale drawings, calculating costs for different types of wood and presenting the information in a table format so that the customer can easily compare the costs of using different materials and decide the best option for them.

10. DIY — calculating the cost of decorating a room. Scale drawings from builders may be available for dimensions. Calculating areas to decide how much paint/wallpaper to buy. Working out total costs. This could also be used to provide a job estimate or quote for doing the work.

11. Setting up a fish tank by calculating the dimensions, volume of water. How many fish can go into the tank? Calculating the concentration of fish product needed to neutralise the chlorine in the water/bacteria for the filter based on manufacturer’s instructions.

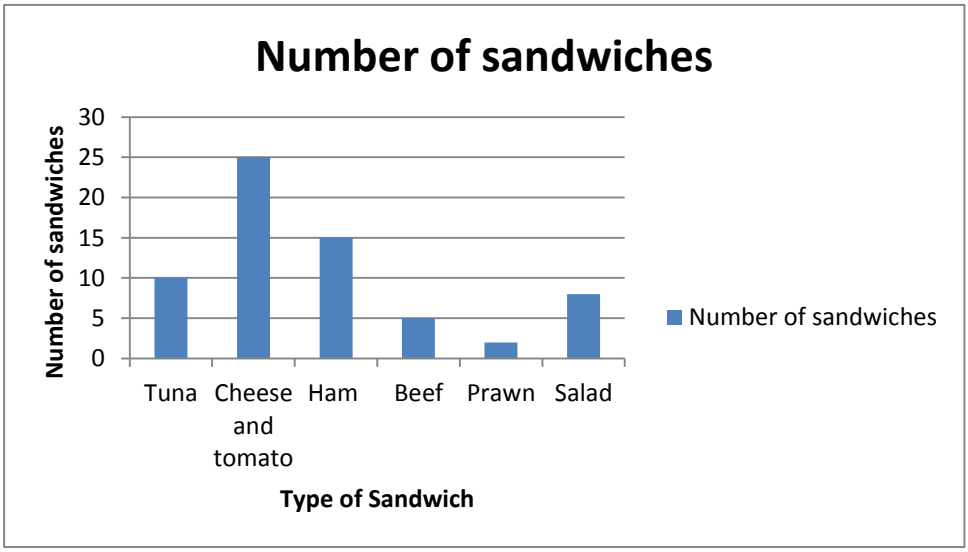
12. Based on a given scenario, learners could be asked to work out a staff shift rota for an event. This could also include calculating staff costs at a given rate.

Outcome 2
The learner will interpret graphical data, and situations involving probability to solve simple, real-life problems involving money/time/measurement.

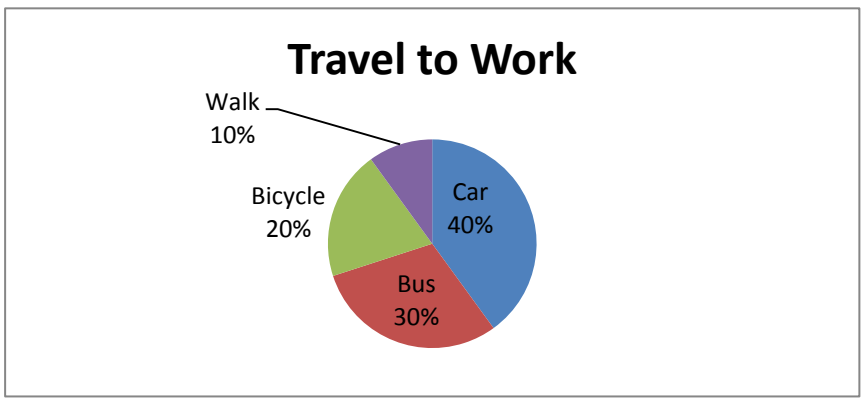
1. Extracting and interpreting information from a holiday brochure containing destination temperatures recorded over a period of 12 months. From a table such as this, learners could interpret the data to identify which months would be the hottest and also to decide when would be the best time of year to go for a beach holiday.

Average monthly temperatures in Portugal											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
15°C	16°C	18°C	20°C	22°C	25°C	28°C	26°C	22°C	19°C	18°C	16°C

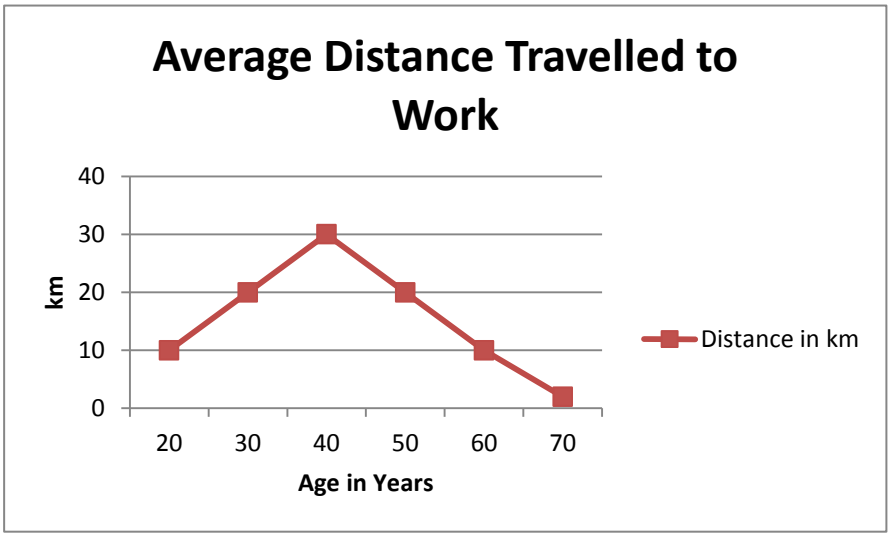
2. Extracting and interpreting information from a bar graph presented by a sandwich company which produces a range of sandwiches for school lunches. From a bar chart such as this, learners could be asked to identify the most and least popular types of sandwiches and decide how many slices of bread in total would be needed to make the sandwiches.



3. Extracting and interpreting information from a pie chart similar to the one below which shows ways in which people travel to work. Learners could be asked to identify which type of transport is the most popular and suggest the likely distance from home to work. This example could also be used in the contexts of global citizenship or the environment.



4. The line graph below shows the trend in the distances people travel to work as they age. Learners could be asked to use the line graph, to identify the typical distance travelled to work by someone in their 20s. As far as possible, real data should be used.



5. The concept of probability could be developed by learners working in pairs each with a die. One goes EVEN the other ODD. They roll their dice, they add what is shown on both dice and if the total is even then whoever is EVEN scores a point, similarly if it is odd whoever is ODD scores a point. They repeat this 20 times and the winner is the one with most points. In this activity, the probability of the overall winner being ODD or EVEN is equally likely.

6. Same as 5 above except that this time the scores on the dice are multiplied together. They repeat this 20 times and the winner is the one with most points. In this activity, the overall winner will almost certainly be EVEN.

7. Use weather statistics to predict the probability of different types of weather.

8. Use appropriate vocabulary to state the likelihood of a set of events happening during the course of a day and introduce the probability scale.

9. The teacher/lecturer has a pack of cards and shows a card to the class. They are asked to raise their hands if they think the next card is going to be HIGHER (or LOWER depending on what the teacher chooses). The teacher shows the next card and those who chose (guessed) correctly are identified. This can be extended until there is only one learner left who has managed to give all the correct choices.

Administrative information

Published: April 2012 (version 1.0)

Superclass: to be advised

History of changes to Unit Support Notes

Unit details	Version	Description of change	Authorised by	Date