Unit Support Notes

Unit Support Notes — Numeracy (National 4)

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

Contents

Unit Support Notes

Introduction

These support notes provide advice and guidance to support the delivery and assessment of the Numeracy (National 4) Unit. They are intended for teachers and lecturers who are delivering the Unit.

They should be read in conjunction with the:

- the *Unit Specification*

Where the Numeracy (National 4) Unit is being undertaken as part of the National 4 Lifeskills Mathematics Course, or the National 4 Mathematics Course, these *Unit Support Notes* should also be read in conjunction with:

- the *Course Specification*
- the *Course Support Notes*
- the *Added Value Unit Specification*
- appropriate assessment support materials

General guidance on the Unit

Aims

The Numeracy (National 4) Unit is a mandatory Unit in the Mathematics (National 4) Course and the National 4 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 straightforward, real-life problems involving number, money, time and measurement. As learners tackle real-life problems, they will decide what numeracy skills to use and how to apply those skills to an appropriate level of accuracy. Learners will also interpret graphical data and use their knowledge and understanding of probability to identify solutions to straightforward real-life problems involving money, time and measurement. Learners will use their solutions to make and explain decisions.

Learners who complete this Unit will be able to:

1 Use numerical skills to solve straightforward, real-life problems involving money/time/measurement
2 Interpret graphical data and situations involving probability to solve straightforward, 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 3 Lifeskills Mathematics Course or its component Units
- Numeracy (National 3) Unit
- SCQF level 3 Core Skills Numeracy

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 experiences and outcomes 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 the Unit

Information about skills, knowledge and understanding is given in the National 4 Lifeskills Mathematics *Course Support Notes* and the National 4 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 4 Lifeskills Mathematics *Course Support Notes* or Appendix 1 of the Mathematics *Course Support Notes*.

The following table outlines suggested content for each Assessment Standard within the Unit:

Assessment Standard	**Skills, knowledge and understanding**
Outcome 1: The learner will use numerical skills to solve straightforward, real-life problems involving money/time/measurement	
1.1 Selecting and using appropriate numerical notation and units	♦ Numerical notation should include: =, +, –, ×, /, ÷, <, >, ( ), %, colon and decimal point ♦ Units should include: — 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)
1.2 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, by 10 or 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 miles 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
1.3 Recording measurements using a straightforward scale on an instrument	♦ use measuring instruments with straightforward scales to measure length, weight, volume and temperature ♦ read scales to the nearest marked, unnumbered division with a functional degree of accuracy
1.4 Interpreting the measurements and the results of calculations to make decisions	♦ 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 Explaining decisions based on the results of calculations	♦ give reasons for decisions based on the results of calculations
Outcome 2: The learner will interpret graphical data and situations involving probability to solve straightforward, real-life problems involving money/time/measurement.	
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
2.2 Making and explaining decisions based on the interpretation of data	♦ make decisions based on observations of patterns and trends in data ♦ make decisions based on calculations involving data ♦ make decisions based on reading scales in straightforward graphical forms ♦ offer reasons for the decisions made based on the interpretation of data taking into account bias and/or sample size

2.3 Making and explaining decisions based on probability	♦ recognise patterns and trends and use these to state the probability of an event happening ♦ make predictions and use these predictions to make decisions ♦ use relative frequencies, contingency tables and describe probability through the use of percentages, decimal fractions and fractions to make and explain decisions

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 straightforward. This may include for example, 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 materials 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 5) Unit
- Core Skills: Numeracy (SCQF level 5)
- other Units within the National 4 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 4 is in a hierarchy with the Numeracy Unit at National 3 and National 5. This hierarchical structure aims to facilitate progression and provide 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; 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 fund raising events could involve learners managing money and data. For example, collecting, recording and interpreting data on money pledged and collected. Learners could also be asked to calculate the amount of profit/loss or offset expenditure against money collected. Notions of chance and uncertainty could be discussed in terms of the number of participants and expected amounts of money to be raised.
- 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. These results could then be represented in different graphical forms and interpreted as part of a write up following the event. Comparisons of data could be made. Learners could also be involved in the measurement of events and the recording of results. The results could be interpreted to explain decisions about the strongest and fastest participants or the highest scoring teams.
- 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 also 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 given 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, maps or plans. ♦ When measuring distance, scale will be used, which may also allow for the use of ratios. ♦ Learners may also be asked to consider percentage amounts of land taken up for particular purposes, eg housing, industry or recreation. Ratio and proportion could also be explored. ♦ Learners could also be involved in measuring or observing and recording information. For example, measuring the volume of tank, collecting field samples or estimating the height of a tree. ♦ Surveys could explore the use of relative frequencies and probability measured as fractions, decimal fractions and percentages.
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 or when calculating ratio and proportion for ingredients. ♦ Calculations could also be used to work out percentage dietary requirements and understand food labelling. ♦ Learners could also work with lifestyle statistics to make choices associated with their own health and wellbeing. ♦ Undertaking a basic costing exercise to compare convenience foods with fresh 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 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 probability and 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. ♦ Sporting events could be used to explore probability expressed as percentages, fractions or as a ratio.
Social studies	♦ Exploring the use of numeracy in business. 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 use scenarios to calculate profit and loss. ♦ Learners could extract numerical information and present this in a prescribed layout which will enable decisions to be taken in business. For example, identify trends and possible risks to sales and decide whether new staff should be recruited over the summer holidays.

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, bias and reliability in data. 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.

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 larger numbers, manage time, or check answers to complex 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 government statistics, extracts from company spreadsheets, invoices, magazine articles, bills, leaflets and adverts.

Group work approaches can be used within 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 learn has met the required Assessment Standards for the Unit or Course.

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 and explain 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 4 Lifeskills Mathematics *Course Support Notes* and the National 4 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 possible 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
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 straightforward 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.
Analysing and evaluating is the ability to identify and weigh up the features of a situation or issue and to use your judgement of them in coming to a conclusion. It includes reviewing and considering any potential solutions.	Wherever possible, learners could be given the opportunity to interpret the results of their calculations and to draw conclusions. Conclusions drawn by the learner could be used to form the basis of any reasoning by making and explaining choices or decisions to solve a given problem. Aspects of probability may provide appropriate opportunities for analysis and evaluation.

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:** Estimating and then calculating the time taken for a journey on various types of road, eg a motorway compared with a B road, when given the average speed for each road type and the distance to be travelled.

	Example 2: Based on a utility bill for a number of university students living together, calculate the cost per quarter, adding VAT at 20%. Calculate the cost for each student if the bill is shared among them.
Projects or Investigations	**Example 1:** Plan the loading of a removal van involving the measurement both of the available space and the size of each container. Create scale drawings and making decisions regarding the best way to fit the containers in the removal van. **Example 2:** Investigate savings rates offered by a variety of banks and building societies and work out interest gained over a period of time. Learners could also investigate the effects of interest rates on borrowing.
Case Studies	**Example 1:** Using given data showing the costs for a broadband and media package. Calculate the monthly cost of the package, determining affordability against a given budget. Increase or decrease the package to make it affordable given a reduction or increase in available budget. **Example 2:** Based on given data for a clothing company which has shops in two cities. Learners could be asked to identify the months when sales were highest for each city and the months when sales were at their lowest. They could determine the months when the combined sales of the shops for one month were higher than a given amount. Based on sales data, learners could be asked to explain when they would close the shops for renovations.
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, such as 'Making and explaining decisions based on the results of measurements and calculations' and 'Making decisions and explaining based on probability'.

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

Whatever 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.

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 Course 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

Numeracy (National 3)	Numeracy (National 4)	Numeracy (National 5)
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 involve only 1 or 2 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 2 steps. Learners at this level may require additional support materials 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	2.1 Extracting and interpreting data from at least two different straightforward graphical forms	2.1 Extracting and interpreting data from at least three different graphical forms ♦ a table with at least five 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	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	♦ 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 ♦ using the probability scale	2.3 Making and explaining decisions based on probability ♦ recognise patterns and trends and use these to state the probability of an event happening ♦ make predictions and use these predictions to make decisions ♦ using relative frequencies, contingency tables and describing probability through the use of percentages, decimal fractions and fractions to make and explain decisions	2.3 Making and justifying decisions based on probability ♦ recognise patterns, trends and relationships and use these to state the probability of an event happening ♦ use evidence from the interpretation of probability to justify decisions ♦ analyse the probability of combined events, identifying the effects of bias and describing probability through the use of percentages, decimal fractions, fractions and ratio to make and justify decisions

Appendix 3: Examples of possible learning and teaching contexts

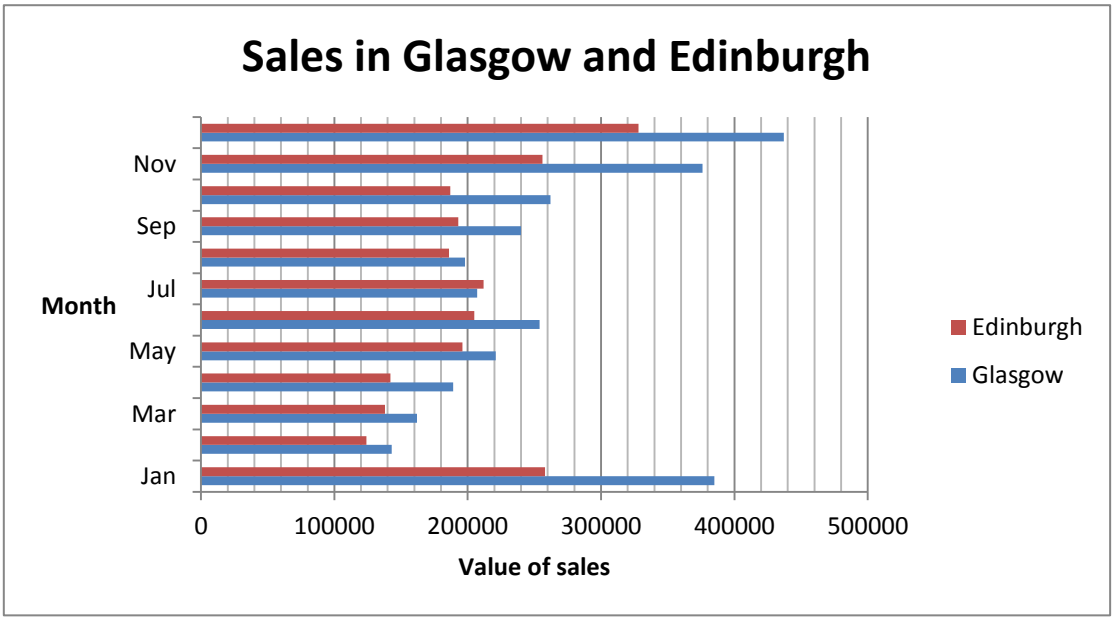
Outcome 1: ***The learner will use numerical skills to solve straightforward, real-life problems involving money/time/measurement.***	
1	Measurement activities both practical and theoretical can be carried out in a variety of familiar real-life contexts. This can include counting squares, or by using common formula and the use of scale drawings. Examples of topics could include: packaging, DIY and cooking. 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 divisions are marked every 10. Learners must be able to measure to the nearest marked unnumbered division.
2	Estimating the time taken for a journey on various types of road, eg a motorway compared with a B road, when given the average speed for each road type and the distance to be travelled.
3	Based on a savings account with a given interest rate calculate annual interest, and given a decrease in the interest rate, calculate the reduction in savings.
4	Using a utility bill calculate for example average costs per day, discounts, adding VAT at 20% and calculating the costs if the bill is shared among a given number of residents.
5	Calculating the total cost of a shopping trip involving multiple purchases of a number of items. Fractions and percentages could be introduced to calculate discounts (eg 50% off or half-price sale).
6	As part of renovations for your house, you need to make mortar using a sand and cement mixture to a given ratio of 1:3. Given the volume of cement, calculate the volume of the sand required.
7	Read the given table on costs for a mobile phone tariff. Work out the best deal and decide which provider to use.
8	Given appropriate tables/charts and figures: ♦ Calculate how much money has been made from the number 1 single in the past week. ♦ Calculate how much the artist or group has made compared to the manufacturer. ♦ What percentage does the performer receive?
9	Look up the latest Scottish football tables and answer questions such as: ♦ What proportion of goals are scored at home? ♦ What percentage of goals have been scored by the three top teams?

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

1 Extracting and interpreting information from a table containing a patient's temperature taken by a nurse every three hours over a 24-hour period. Calculate the amount of time during which the patient had a fever and determine when the patient's condition started to improve.

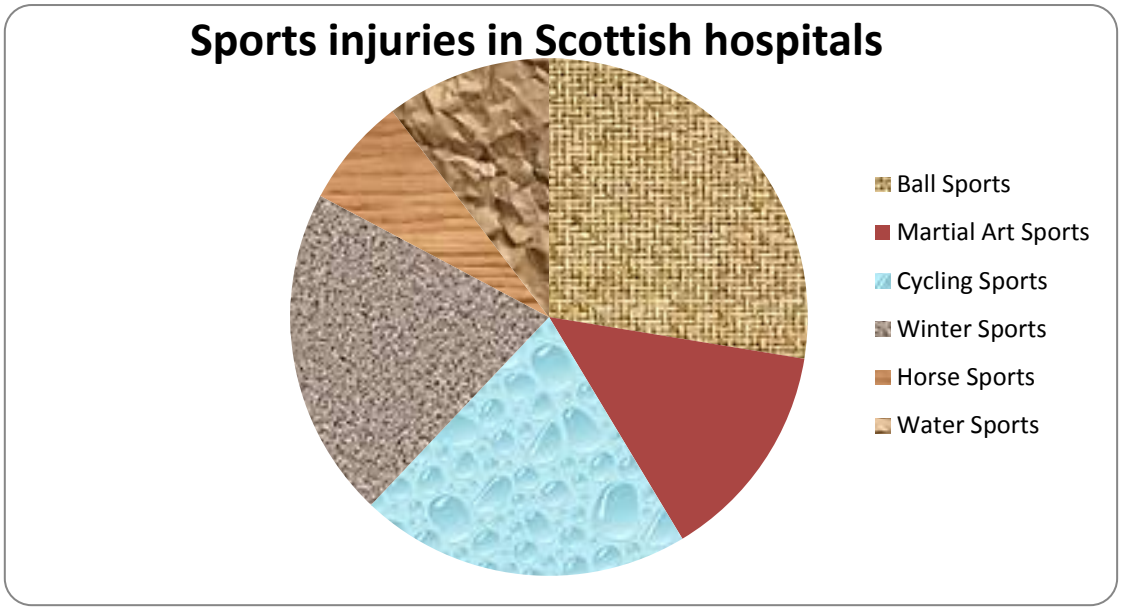
Time	07 00	10 00	13 00	16 00	19 00	22 00	01 00	04 00
Temp (°F)	99	101	102	103	103	102	101	99

2 A clothing company which has shops in two cities reports on its sales in each city from January to December in the form of a bar graph. Identify the months when sales were highest for each city and the months when sales were at their lowest. Determine the months when the combined sales of the shops for one month were higher than a given amount. The owner needs to close the shops for renovations for a month. Which month would be best for the renovations to take place?

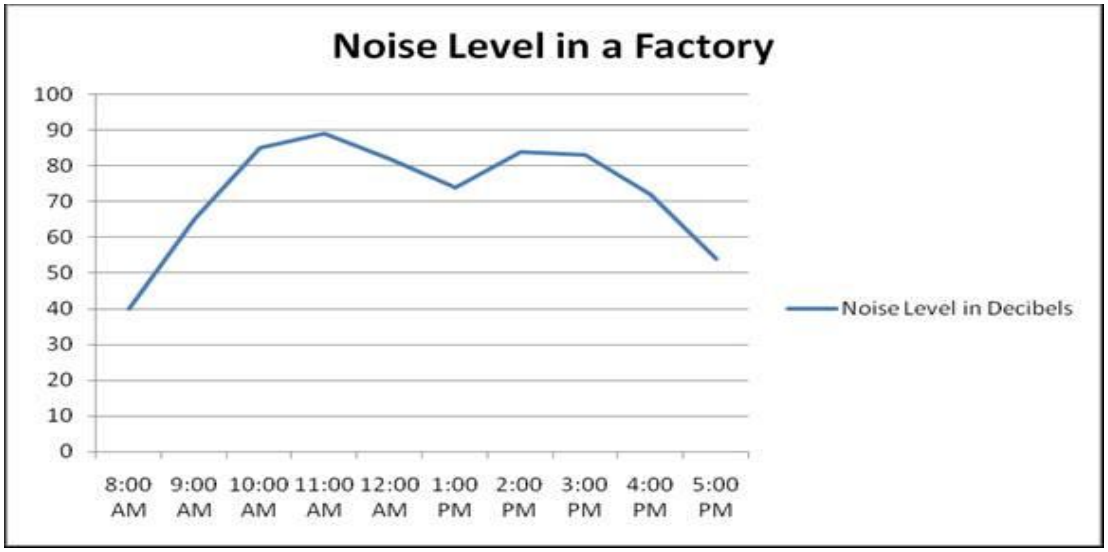


From a graphical form, such as this, learners should be able to extract and interpret data such as trends in sales over the year. They should also be able to make and explain decisions such as the best month to close a shop for renovations and during which months of the year is it most likely that more staff will need to be recruited.

3 From a graphical form such as this, learners should be able to extract and interpret data including the percentages of injuries for each sport. They should also be able to make decisions and explain which sport is the safest. They can also interpret the information and explain the likelihood of an injury occurring in a particular sport and make risk assessments.



4 The line graph below shows noise levels in a factory over the period of a working day.



From a graph such as this, learners should be able to extract and interpret data, such as the time of day when the noise level in the factory reaches a certain value.

They should also be able to explain why noise levels may peak at certain times of the day and make decisions on factors that may help reduce the noise levels.

Administrative information

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Superclass: to be advised

History of changes to Unit Support Notes

Unit details	Version	Description of change	Authorised by	Date