National 3 Applications of Mathematics Course Support Notes

Contents

Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing the National 3 Applications of Mathematics Course. They are intended for teachers and lecturers who are delivering the Course and its Units. They should be read in conjunction with the *Course Specification* and the *Unit Specifications* for the Units in the Course.

Mandatory Units

Manage Money and Data (National 3)	(6 SCQF credit points)
Shape, Space and Measures (National 3)	(6 SCQF credit points)
Numeracy (National 3)[1]	(6 SCQF credit points)

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[1] The Numeracy (National 3) *Unit Support Notes* are published separately.

General guidance on the Course

Aims

The aims of this Course are to enable learners to:

♦ interpret real-life situations involving mathematics
♦ investigate the use of basic mathematical ideas and number processes in real-life contexts
♦ select and apply basic mathematical and numeracy skills in real-life contexts
♦ interpret and use the results of calculations, measurements and data to make informed decisions
♦ communicate mathematical information in an appropriate way

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, thinking skills, literacy and employability.

Progression into this Course

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

♦ National 2 Lifeskills Mathematics Course
♦ Core Skills Numeracy (SCQF level 2)

Experiences and outcomes

New National Courses have been designed to draw on and build on the curriculum experiences and outcomes as appropriate. Qualifications developed for the senior phase of secondary education are benchmarked against SCQF levels. SCQF level 4 and the curriculum level 4 are broadly equivalent in terms of level of demand although qualifications at SCQF level 4 will be more specific to allow for more specialist study of subjects.

Learners who have completed Curriculum for Excellence experiences and outcomes from the Mathematics curriculum area will find these an appropriate basis for doing the Course.

The following skills, knowledge and understanding may also be relevant:

♦ an ability to add and subtract whole numbers
♦ an understanding of how items can be shared equally, the notation and vocabulary associated with simple fractions, and where simple fractions lie on a number line
♦ an awareness of how different combinations of coins and notes can be used to pay for goods or be given in change
♦ experience of using time
♦ the ability to estimate and measure items
♦ knowledge of some features of 2D shapes and 3D objects

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

Skills, knowledge and understanding covered in the Course

This section provides further advice and guidance about skills, knowledge and understanding that could be included in the Course.

The following skills knowledge and understanding from the *Course Specification* will be developed throughout the Units in the Course. However, some Units may offer more opportunities than others for the development of skills, knowledge and understanding as suggested in the table below:

✓✓✓   Significant opportunities to develop within the Unit
✓✓   Some opportunities to develop within the Unit

Skills, knowledge and understanding	Manage Money and Data	Shape, Space and Measures	Numeracy
♦ interpret real-life situations involving mathematics	✓✓✓	✓✓✓	✓✓✓
♦ investigate the use of basic mathematical ideas and number processes in real-life contexts	✓✓✓	✓✓✓	✓✓
♦ select and apply basic mathematical and numeracy skills in real-life contexts	✓✓✓	✓✓✓	✓✓✓
♦ interpret and use the results of calculations, measurements and data to make informed decisions	✓✓	✓✓	✓✓✓
♦ communicate mathematical information in an appropriate way	✓✓✓	✓✓✓	✓✓

Suggested learning and teaching contexts for the development of the above skills, knowledge and understanding for each Unit can be found in the *Unit Support Notes* and in Appendix 1 of this document.

Progression from this Course

On successful completion of this Course, the learner could progress to:

♦ other qualifications in mathematics or related areas
♦ further study, employment and/or training

Approaches to learning and teaching

The purpose of this section is to provide general advice and guidance on approaches to learning and teaching which can be used for any of the component Units within the Course.

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. At this level it is likely that learners will need support when identifying opportunities which reflect personalisation and choice.

The skills based focus of the Course readily lends itself to a variety of approaches to learning and teaching such as: interdisciplinary learning; cross-curricular opportunities; investigative and problem solving approaches; individual/collaborative working, resource-based learning and e-learning. Examples of how each of these approaches could be used within learning and teaching are described below:

Interdisciplinary learning could be used to develop learners' mathematical skills through scheduled or special events, for example:

♦ Trade fairs or sponsored events could involve managing money and data. Learners could collect and record data such as income and expenditure, and results from sponsored events including the amount of money collected.
♦ Shows, exhibitions and plays could be used as contexts to manage money collected from ticket sales and to calculate the costs of production. Learners could also be involved in the timing of these events.
♦ Sports days could provide opportunities to manage data by collecting and recording results from events. These results could be represented in graphical form and interpreted as part of a write up following the event.
♦ Visiting speakers or external visits could highlight when and how money and data is managed in the workplace. This could include retail outlets, IT companies and accountancy firms.
♦ School trips or excursions could be used to apply mathematical and numerical skills in context such as outdoor education centres, field trips, visits to museums, and work experience with local companies.

Cross-curricular opportunities topics or themes could be used to build on the relationship between mathematics and other curriculum areas such as technology, geography, science and physical education. For example:

Curriculum area	Possible cross-curricular learning and teaching links
Technology	♦ using knowledge of shape, space and measurement to design and make items ♦ working with a range of measuring tools and equipment ♦ managing the timing of practical tasks
Art	♦ using knowledge of shape and space to create pictures or patterns
Geography	♦ taking and recording measurements during field trips ♦ using scale when working with maps ♦ collecting, organising and presenting data from field trips
Health and wellbeing	♦ using a range of measuring instruments during cooking or when preparing food ♦ carrying out calculations associated with dietary requirements and food labelling ♦ applying fractions when using recipes
Science	♦ recording data collected during experiments ♦ presenting data in different ways, manipulating data and interpreting the results
Physical education	♦ measuring physical achievements, recording and reporting results to others in graphical form ♦ taking fitness measurements such as heart rate and breathing rates ♦ combine knowledge of maths, geography and physical education in orienteering activities ♦ comparing fitness data and recording changes over time ♦ exploring the notions of chance and uncertainty in sporting events

Investigative/problem solving approaches may provide the opportunity for learners to observe, explore, experiment and discuss mathematical approaches to solve real-life problems. For example, by asking 'what would happen if….?, learners could explore the concepts of chance and uncertainty, investigate best value, or find out what would happen when a basic scale factor is applied to a diagram or object. This approach has the potential to stimulate mathematical thinking, especially when supported by questioning and/or discussion. Prompt questions could be used to establish learners' understanding for example: 'What did you do to work that out? Could this 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' mathematical strategies for tackling real-life tasks. For example:

♦ Learners could be asked to work on their own to create a set of instructions for a task; they could then give these instructions to someone else to follow.

- Online tests, textbook exercises, quizzes or competitions could also be used to practise 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 possible.

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 that each learner has met the required assessment standards for the Unit or Course.

Resource based learning could include for example:

- Using technology to collect, organise and represent data and information.
- 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 with 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 invoices, publications, bills and adverts.

E-learning
Where resources permit, centres could use technology to support learning and teaching. For the National 3 Applications of Mathematics Course this could include:

- using ICT and other technologies such as calculators and computers for handling data and performing more complex calculations
- using multi-media packages to work with geometry
- using online tests and interactive programmes
- using spreadsheets and other data handling programmes to collect, record and manipulate data

Specific examples of learning and teaching contexts that could be used for the Units within this Course can be found in Appendix 1.

Examples of suggested learning and teaching resources can be found in Appendix 2.

Sequencing and integration of Units within the Course

Sequencing and integration of the delivery and assessment of the Units within the Course is at the discretion of the centre.

The examples which follow illustrate possible sequences and opportunities for integration. Please note that other combinations are also possible.

Example 1
This example shows the possibility of delivering the *Manage Money and Data* Unit and *Shape, Space and Measures* Unit sequentially, with the *Numeracy Unit* being delivered throughout. This sequence would allow the opportunity to reinforce and consolidate the development of numerical skills across the Course. For example, learners could develop and evidence their ability to select and use calculations and interpret data and situations involving probability through the topics and contexts used for the other mandatory Units. The *Manage Money and Data* Unit and *Shape, Space and Measures* Unit can be delivered in any order.

Numeracy

Manage Money and Data → Shape, Space and Measures
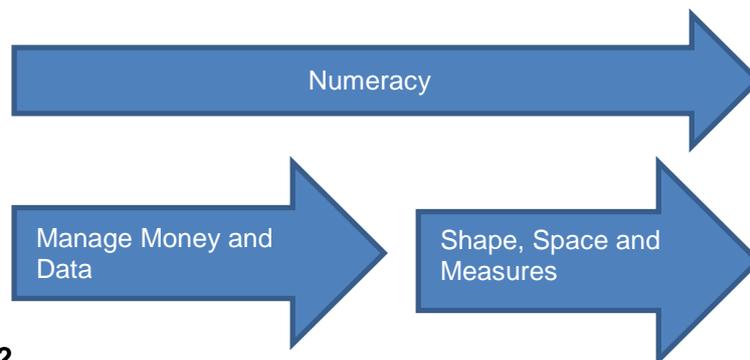
Example 2
This example shows the possibility of delivering all three Units: *Manage Money and Data; Shape, Space and Measures* and *Numeracy*, concurrently. This approach would be particularly suitable if a thematic or topic based approach to learning and teaching is adopted. For example, learners could develop and evidence a range of Outcomes and Assessment Standards through the study of a social studies topic, preparation for Sports Day or a whole school event such as a trade fair or concert.

This example has the potential of maximising the relevance and transferability of mathematics and can promote interdisciplinary or team teaching approaches.

Manage Money and Data

Shape, Space and Measures
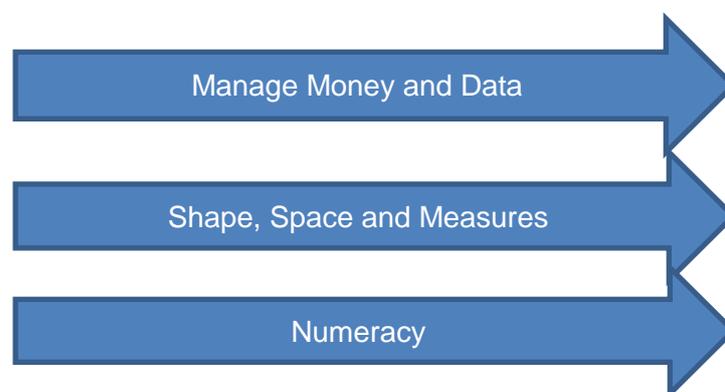
Numeracy

Example 3

This example shows the possibility of delivering the *Numeracy* Unit, *Shape, Space and Measures* Unit and the *Manage Money and Data* Unit, sequentially. This approach could be particularly suitable for learners who would benefit from a reinforcement and consolidation of their numerical skills at the beginning of the Course. The focus on the development of numerical skills using the contexts of money, time and measurement would also provide an introduction to the themes contained within the subsequent Units. The *Shape, Space and Measures* Unit, and the *Manage Money and Data* Unit, can be delivered in any order.
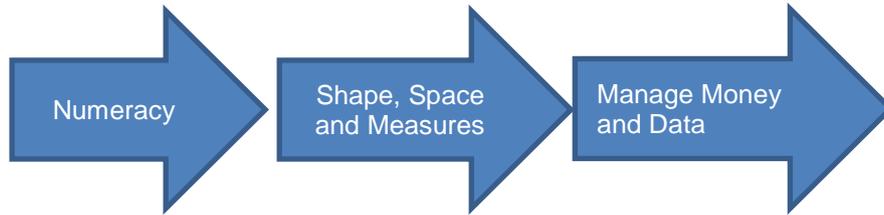
Developing skills for learning, skills for life and skills for work

The *Course Specification* lists the skills for learning, skills for life and skills for work that learners should develop through this Course. These are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and should be built into the Course where there are appropriate opportunities.

Throughout the Course there are significant opportunities to develop the following skills for learning, skills for life and skills for work:

2   Numeracy

2.1   Number processes
2.2   Money, time and measurement
2.3   Information handling

5   Thinking skills

5.2   Understanding
5.3   Applying

Understanding — Learners will have the opportunity to develop their understanding of mathematics by using the results of calculations and their interpretation of data to make informed decisions.

Applying — Learners will develop their ability to apply skills, knowledge and understanding by selecting and using appropriate mathematical processes and strategies to solve problems in a range of real-life contexts.

Numeracy — Learners will have the opportunity to develop their numerical skills by selecting and applying number and number processes and interpreting data and the results of calculations to make informed decisions about money, time and measurement.

In addition, there may also be opportunities for learners to develop their literacy and employability skills.

Literacy — Learners will develop their literacy skills by accessing, engaging in and understanding their learning and communicating their thoughts, ideas and opinions. This Course will provide learners with the opportunity to analyse real-life contexts and communicate their thinking by presenting mathematical information using numbers, diagrams, symbols and words.

Employability skills — Learners will develop their employability skills through the mathematical and reasoning skills developed in this Course. It aims to achieve this by providing learners with the opportunity respond effectively to routine mathematical situations which may arise in work situations.

Further guidance on the development of skills for learning, skills for life and skills for work can be found in the *Unit Support Notes*.

Approaches to assessment

Learners will benefit from receiving accurate and regular feedback regarding their learning. This helps to ensure they are actively involved in the assessment process. It is also important that different approaches to assessment are adopted to suit the varying needs of learners.

Combining assessment across Units

When the Units are delivered as part of a Course, the assessment of Units can be combined.

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

A combined approach to assessment has the advantage of:

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

Assessment strategies and methods

The skills-based focus of the Course readily lends itself to a variety of approaches to assessment. Whichever approach is used, 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 aims and purposes of the Course

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

Suggested assessment approach	Units	An example of how this approach could be used across the Course
Problem solving tasks or activities	♦ Manage Money and Data Unit ♦ Numeracy Unit	A financial problem could be given to learners which would draw on the *Manage Money and Data Unit* as well as the *Numeracy Unit*. For example, learners could be asked to work with given financial information relevant to their circumstances. This may include identifying factors affecting income such as grants and allowances, and expenditure such as lunches and bus fares. Learners could be asked to produce a budget which takes into account income and expenditure and to develop a savings plan for an item such as a bicycle or smartphone. Learners could be asked to use real-life resources to find out the best deal for their bicycle or smartphone and calculate how long it would take them to save up enough money.
Projects or investigations	♦ Manage Money and Data Unit ♦ Shape, Space and Measures Unit ♦ Numeracy Unit	A project/investigation could be used to combine the assessment of numeracy, data handling, and shape and space. For example, learners could be asked to investigate the amount of fencing required for a number of gardens in a local area. Learners would need to collect data on the perimeter of different regular shaped gardens from regular 2D plans. Learners could be asked to record this data in tabular form and perform calculations to work out how much fencing each garden would need. Costs for the fencing could be calculated for each garden, and for all of the gardens in total. Basic scale factors could be applied if smaller or larger gardens are required.
Short/extended response tests	♦ Manage Money and Data Unit ♦ Shape, Space and Measures Unit	Learners could be given short or extended response tests online or on paper which covers the Outcomes and Assessment Standards for each Unit. Where possible all questions should be set within a realistic and relevant context for the learners and could include a mix of short and extended response questions.

	♦ Numeracy Unit	

When designing internal assessments, 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
♦ provide a balance of assessment methods and adopt alternative approaches to gathering evidence which build in opportunities for personalisation and choice

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 which shows learners' ability and understanding
♦ computer-generated assessment records or printouts from simulations, eg SQA Solar or online tests
♦ photographs of project or investigative work
♦ a product such as a spreadsheet or computer-generated graphic

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

When evidence for the Course is collected using a combined approach, the use of the combined skills list provided in Appendix 3 may be helpful.

Evidence must be generated for all Outcomes and Assessment Standards.

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. Re-assessment opportunities could be built into other assessment opportunities within or across Units.

Authentication
Assessment should be carried out under supervision.

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.*

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.

Equality and inclusion

The additional support needs of learners should be taken into account when planning learning experiences or when considering any reasonable adjustments. Assessment methods should offer learners an equal opportunity to demonstrate their achievement. This should be reflected in the language used, the use of different assessment methods and the use of appropriate illustrative materials which reflect an inclusive view.

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:

♦ allowing extra time to complete tasks
♦ practical helpers under direct learner instruction could assist with practical measurement activities (this could also include a reader or scribe as appropriate)
♦ 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.

Further details about equality and inclusion relevant to each Unit can be found in the *Unit Support Notes*.

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

It is important that centres are aware of and understand SQA's assessment arrangements for disabled learners, and those with additional support needs, when making requests for adjustments to published assessment arrangements. Centres will find more guidance on this in the series of publications on Assessment Arrangements on SQA's website: www.sqa.org.uk/sqa//14977.html.

Appendix 1: Suggested learning and teaching approaches across the Course

Applications of Mathematics: Manage Money and Data (National 3)		
The learner will manage money in basic real-life contexts.		
Assessment Standard	**Explanation of standard**	**Suggested learning and teaching contexts**
1.1 Identifying factors affecting income and expenditure	Factors affecting income and expenditure for different personal circumstances including: ♦ basic pay ♦ benefits and allowances ♦ income tax ♦ VAT ♦ 'needs and wants' (eg utility bills, food shopping, clothing)	Scenarios could be used to encourage learners to find out pay, and pay deductions for a given jobs or career. Real-life materials, such as job advertisements could be used or simplified. Compare rates of pay for a variety of advertised jobs where some are quoted weekly, monthly or annually. Calculate pay with bonuses where extra payment is given for producing more than a stated number of items. Check and correct simplified wage slips with deductions (Income Tax, National Insurance etc.) and/or supplements (bonus, overtime etc.) for mistakes which have been deliberately included. Learners could be encouraged to produce a list of needs and wants and identify ways in which income could be generated to pay for them. Calculations could involve: basic pay with income tax deducted or shopping with VAT added. Take a record of how much a family spends on food each week. This can be recorded, analysed and used for budgeting. The consumption of gas/electricity can be treated similarly. Ask learners to use the Internet to determine the current job seekers allowance and work out how much that would be per day.

		Ask the learners to calculate how much they would receive if they were to work an 8-hour day for a minimum wage and use the Internet to calculate the deductions from pay.
1.2 Preparing a simple budget	Balancing income and expenditure.	Scenarios or personal contexts could be used for learners to balance income and expenditure over a given period of time. Learners could be encouraged to use spreadsheets to organise budget information and perform calculations. Learners could be asked to cost a small job of work, eg gardening. This could include basic labour costs taking into account tax and National Insurance and the cost of any materials.
1.3 Developing a basic savings plan	For an item or event.	Learners could be asked to investigate the cost of an item such as a pair of shoes or event they would like to attend. They could develop a savings plan for the item/event. Learners could be encouraged to use spreadsheets to organise data and perform calculations. This could involve calculating amounts of money to be saved over a given period of time to cover the costs of the item or event. When developing a basic savings plan it is important to look at interest rates. Learners can find what rates of interest various institutions are offering and how this will affect their savings. Learners may have to be shown how to calculate a percentage. Ask learners to research the cheapest seven day holiday in Spain. Calculate how much they would need to save each month for the next 12 months to afford the holiday.
1.4 Making a decision based on the best deal	Compare two products, given two pieces of information on each.	Learners could use the Internet or other resources to investigate and source information about a chosen product. Given two pieces of information, eg cost and discounts, learners could compare two products to determine the best deal. Buying and selling simulations such as a class shop could be used. Use Concept Cartoons for example, to set up a comparison of prices that are VAT inclusive and 'plus VAT' to deduce the 'best deal'.

		Ask questions such as:
		Does buying the biggest size result in the cheapest unit cost? Is it sensible to buy all items in bulk to get the cheapest unit cost?
		For making a decision based on the best deal, learners could be asked to find or be shown examples of offers such as, 'Buy one get one free', ' Two for the price of one', 'Sale 50% off all items' etc and how these can be calculated and compared. Shop buying simulations could improve learners' mental calculations by calculating the cost of purchases and how much change they expect to get back.
		Provide the learners with two different adverts showing the same piece of electrical equipment. One should show 10% off and the other with a cheaper starting price. Ask the learners to decide which one they would buy and why.
		Repeat this with items of food with one advert showing 'buy one get one free', one showing 'two for the price of one' and one showing half price. Ask the learners which they would buy and why.
		Compare costs of a hotel stay offering full board compared to bed and breakfast. Make a decision as to which hotel they would use and why.

The learner will manage data in real-life contexts.		
Assessment Standard	**Explanation of Standard**	**Suggested learning and teaching contexts**
2.1 Organising primary data	Tables, lists or tally charts	An investigative or project approach could be used to collect, record, analyse, represent and interpret data. This could provide an opportunity for cross curricular work with perhaps the PE department, eg comparison of average times/number of repetitions and sets of exercises/total weight lifted/results from fitness tests/blood pressure and pulse rates between classes for various events. The data generated could be displayed in a variety of ways and conclusions drawn about the fitness of the groups.

Ask learners to produce a table showing how much time they spent outside each day in the preceding week. Draw a bar chart to illustrate these figures. Calculate the average time spent outside each day. This could be repeated for time spent: watching TV, playing computer games, eating or learning. Learners could discuss the implications of the results.

Learners could conduct a survey about the amount of time other people spend: watching television, playing computer games, and playing outside over the period of a week. Primary data could be organised using a tally chart. Learners could then be asked to represent the data in a particular graphical form. Calculations could be carried out to compare the data, eg what activity is the most common and draw simple conclusions from these results.

Ask learners to record the temperature in the room at the same time each day in a tabular format. Draw a line graph to illustrate the figures and estimate the temperature expected for the following day. Discuss how this might influence heating bills at home or the clothes we wear.

Learners may use technology to manage data and create graphical forms. |
2.2 Carrying out simple calculations to compare data	Totals or simple averages	
2.3 Representing data in an appropriate format	Presenting basic statistical diagrams with given simple scales. These should include: ♦ pictographs ♦ bar graphs ♦ line graphs Technology may be used	
2.4 Interpreting simple data to draw conclusions		

Applications of Mathematics: Shape, Space and Measures (National 3)		
The learner will use shape and space in basic real-life contexts.		
Assessment Standard	**Explanation of Standard**	**Suggested learning and teaching contexts**
1.1 Calculating and using the perimeter and area of a regular 2D shape	♦ Regular 2D shape to include a rectangle or square. ♦ Find the area by counting squares and by formula in words or symbols.	A problem solving approach could be used to develop geometric skills using real-life contexts. Use Concept Cartoons or Dear Doctor letters to pose problems such as: 'A 5m by 4m rectangle has an area of 20 square metres and a perimeter of 18m. Are there any rectangles whose area and perimeter are equal?' or 'A 5m by 4m rectangle has an area of 20 square metres (or perimeter of 18m). What other sizes of rectangles (whole numbers dimensions?) have an area of 20 square metres (or perimeter of 18m)? Learners could also be asked to calculate the perimeter and area of a rectangular garden to work out how much fencing would be required and how many square metres of lawn would be needed to cover it. Learners could calculate the area of the garden by counting squares or by using a simple formula. Measure up a window for a curtain or blind.
1.2 Calculating and using the volume of a cuboid	♦ Find the volume by counting cubes and by formula in words or symbols.	A practical problem solving approach could be used to develop geometric skills using real-life contexts. Where possible this work could be linked to other areas of the curriculum such as Science or Home Economics. Use Concept Cartoons or Dear Doctor letters to pose problems such as: 'How many different sizes of boxes (whole number dimensions) have a volume of 480 cubic centimetres?'

		Learners could be given the opportunity to handle a number of containers of various sizes to estimate and then measure their volume. Learners should have a working knowledge of appropriate standard and non-standard measures for volume such as litres and millilitres, spoons and cups. Learners could investigate how many tubes of sweets make up one layer in a box, how many layers of tubes can be fitted in a box and how many tubes will fill each box.
1.3 Giving or following directions	Directions for a simple route, journey or task involving spatial awareness, eg completing a picture following the directions given by someone else	Where possible, links to other curriculum areas such as geography and art or design technology could be used. Learners could make use of simple local maps or plans of the local area or buildings to give or follow written or verbal instructions. Instructions could include direction, measurements such as distance/time, and prepositions such as next to, above, below etc. Create pictures or models in pairs with one learner describing how to create a picture or model they have made to another learner who can't see it.
1.4 Working with simple patterns	♦ repeating, continuing or creating ♦ involving shape	Learners could use a problem solving or investigative approach to identify and continue or repeat patterns involving shape. For example learners could create, copy or continue a tiling pattern using a shape template for a carpet, floor tiles or wallpaper. This activity could be done practically using contexts draw from real-life. Use given templates for a variety of shapes to discover which ones tessellate. Learners could also be asked to create their own patterns and then swap with others to continue or repeat.

The learner will use measures in basic real-life contexts.		
2.1 Selecting and using appropriate units of measurement	Investigating and understanding basic everyday measurements including: length, weight, volume and temperature	A range of practical activities could be used to allow learners to estimate and carry out measurements involving length, weight, volume and temperature in everyday life. Links could be made with other curriculum areas such as PE, Home Economics and Design Technology. Although learners will not be assessed on the selection of measuring instruments, this should form a natural part of learning and teaching. Equivalence within the same measurement family should be taught, eg 10mm = 1cm, 1000g = 1kg. As an extension learners could investigate comparisons across measurement families by comparing solid and liquid volumes 1kg = 1lt water and 1lt = 1000ml = 1000cm³ Ask learners to suggest appropriate units to measure for example, a football pitch, the distance to London, the length of a curtain, the height of a door, and the length of a nail. Practise estimating, measuring and recording lengths in different units using different measuring instruments.
2.2 Stating and using simple formulae expressed in words or symbols	♦ Area ♦ Perimeter ♦ Volume	This Assessment Standard could be delivered through Outcome 1 when calculating and using the perimeter, area and volume of shapes and objects.
2.3 Interpreting simple scale drawings	Where the scale is expressed in words or numbers scale: 1cm to 2m	Learners could be given simplified plans or maps to interpret actual distances or measurements. Scale and actual measurements could be recorded in tabular format.
2.4 Applying a basic scale factor	Problems involving increase/decrease an amount or measurement according to a scale factor	A range of practical activities or problem solving activities could be used to allow learners to estimate and apply a basic scale factor, eg doubling or halving amounts involving length, weight, volume or temperature in everyday life. Links could be made with other curriculum areas such as PE, Home Economics and Design Technology.

| 2.5 Calculating time intervals to manage tasks or activities | Use 12-hour and 24-hour times for simple problems | Learners could be engaged in simple problem solving tasks involving the management of time. Examples could include travel arrangement, event management, cooking times. Learners should be familiar with both 12 hour and 24 hour clock times and understand their inter-relationship although this will not be assessed. Where possible, learning and teaching examples should relate to the learners' own experiences or routines. Where possible, learners should be able to use available resources such as timetables and time measuring devices such as stopwatches and clocks. |

Numeracy (National 3)		
The learner will use numerical skills to solve simple, real-life problems involving money/time/measurement.		
Assessment Standard	**Explanation of Standard**	**Suggested learning and teaching contexts**
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)	♦ A wide range of approaches could be used for learning and teaching numeracy skills. These could include: ♦ discrete numerical exercises using textbooks and worksheets ♦ contextualised short and extended response questions ♦ investigative work requiring the selection and application of numerical skills ♦ interdisciplinary activities which involve the selection and use of a range of numerical processes such as art, craft subjects, technology, home economics, physical education and geography ♦ To enrich the delivery of the Numeracy Unit, it is recommended that learners develop the ability to: ♦ Use knowledge of rounding and estimation to check or decide if an answer is appropriately accurate.
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 one or two digit whole numbers ♦ 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, decimals and percentages	♦ Use mental strategies such as number facts, doubling, halving, place value, adding-on, timestables, approximation and factors to carry out calculations efficiently. ♦ Understand the interrelationships between fractions, decimal fractions and percentages to choose an efficient route to a solution. For example, when asked to evaluate a discount of 10% on an item costing £100, an elegant solution would involve understanding that 10% is the same as a 1/10, and that calculating 1/10 of £100 will give the same answer as 10% of £100. ♦ Examples of contexts in which these skills can be applied are given in the Numeracy *Unit Support Notes*.

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	♦ 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. ♦ Analogue and digital readouts could be matched and/or compared. ♦ Measurement activities can be carried out in a variety of familiar real-life contexts. This can include counting squares, or by using common formula and scale drawings. Examples of topics could include: packaging, DIY and cooking.
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 or calculations	♦ make simple decisions; an explanation is not required	♦ Learners could be given the opportunity to discuss in groups what decisions could be made based on the results of measurements or calculations.

The learner will 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	♦ This aspect of the Numeracy Unit could be delivered at the same time as the data Outcome in the *Manage Money and Data* Unit. ♦ Additional examples of contexts in which these skills can be applied are given in the Numeracy *Unit Support Notes*.
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	♦ This aspect of the Numeracy Unit could be delivered at the same time as the data Outcome in the *Manage Money and Data Unit*. ♦ Additional examples of contexts in which these skills can be applied are given in the Numeracy *Unit Support Notes*.
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	♦ Learners could be introduced to the idea of probability as a measure of chance and uncertainty. This could include reference to the likelihood of events happening in familiar contexts. ♦ Introduce the probability scale and use simple fractions, decimals or percentages to describe or measure probability. ♦ Examples could include: the chance of winning a sporting event; the likelihood of rain, based on a weather forecast; the chances of developing a cold when exposed to someone with a cold; the likelihood of having an accident when driving with undue care and attention.

Appendix 2: Suggested resources

The following table lists organisations that may provide suitable resources for the delivery of the National 3 Applications of Mathematics Course.

Suggested organisation available through the web	Possible resources or support materials
BBC Scottish Bitesize Maths	Provides lots of online resources for teaching and learning mathematics.
BBC Skillswise Maths	Is a free-to-access website for adult tutors and students, with printable worksheets and factsheets and online games, videos and quizzes.
Teaching Ideas	Provides lots of online resources for Mathematics and Numeracy for free. Many examples of contextualised and age graded resources.
Office of Fair Trading Skilled to Go	Skilled to go uses real life consumer situations, such as choosing a mobile phone, to help learners develop consumer skills, knowledge and confidence alongside literacy and numeracy. Skilled to Go is a free toolkit of resources including games, quizzes, role plays and case studies, plus video and audio content.
National Centre for Excellence in the Teaching of Mathematics (NCETM)	The NCETM aims to meet the needs of teachers of mathematics and realise the potential of learners through a sustainable national infrastructure for continuing professional development (CPD). The NCETM provides and signposts high quality resources to teachers, mathematics education networks, HEIs and CPD providers throughout England. At the same time, the National Centre encourages schools and colleges to learn from their own best practice through collaboration among staff and by sharing good practice locally, regionally and nationally. A significant number of resources are also available.
Nrich maths	This website offers thousands of free mathematics enrichment materials (problems, articles and games) for teachers and learners from ages 5 to 19 years. All the resources are designed to develop subject knowledge, problem-solving and mathematical thinking skills. The website is updated with new material on the first day of every month.
STEM Scotland	STEM Scotland is the website to assist you to find information on science engagement in Scotland and is supported by the Office of the Chief Scientific Advisor of the Scottish Government with the aim to champion science in Scotland. This web site will help you to find Science, Technology, Engineering, and Maths activities suitable for various pupil levels linked to the Curriculum for Excellence, family activities, and science engagement for the general public.
Citizens Advice Scotland	Offers an online money advice service including a range of tools and planners

The above resources were correct at the time of print and may be subject to change.

Appendix 3: Exemplar combined skills list for the Units

This recording sheet may be particularly useful if a combined or thematic approach is taken to assess the National 3 Applications of Mathematics Course. The following skills could be combined to demonstrate achievement of the Units.

Manage money in basic real-life contexts by:
♦ Identifying factors affecting income and expenditure
♦ Preparing a simple budget
♦ Developing a basic savings plan
♦ Making a decision based on the best deal

Manage data in basic real-life contexts by:
♦ Organising primary data
♦ Carrying out simple calculations to compare data
♦ Representing data in an appropriate format
♦ Interpreting simple data to draw conclusions

Use shape and space in basic real-life contexts by:
♦ Calculating and using perimeter and area of a regular 2D shape
♦ Calculating and using the volume of a cuboid
♦ Giving or following directions
♦ Working with simple patterns

Use measures in basic real-life contexts by:
♦ Selecting and using appropriate units of measurement
♦ Stating and using simple formulae expressed in words or symbols
♦ Interpreting simple scale drawings
♦ Applying a basic scale factor
♦ Calculating time intervals to manage tasks or activities

Use numerical skills to solve simple, real-life problems involving money/time/measurement by:
♦ Selecting and using appropriate notion and units
♦ Selecting and carrying out calculations
♦ Recording measurements using a simple scale on an instrument
♦ Interpreting measurements and the results of calculations
♦ Making decisions based on the results of measurements and calculations

Interpret graphical data and situations involving probability to solve simple, real-life problems involving money/time/measurement by:
♦ Extracting and interpreting data from at least one graphical form
♦ Making decisions based on interpretation of data
♦ Making decisions based on probability

Appendix 4: Reference documents

The following reference documents will provide useful information and background.

- Assessment Arrangements (for disabled learners and/or those with additional support needs) — various publications are available on SQA's website at: www.sqa.org.uk/sqa//14977.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)
- Principles and practice papers for curriculum areas
- *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*

Administrative information

Published: October 2017 (version 2.0)

History of changes to Course Support Notes

Course details	Version	Description of change	Authorised by	Date
	1.1	Page 10 — Developing skills for learning, skills for life and skills for work section: list of Numeracy and Thinking skills inserted.	Qualifications Manager	May 2014
	2.0	Lifeskills Mathematics changed to Applications of Mathematics	Qualifications Manager	October 2017

Unit Support Notes — Applications of Mathematics: Manage Money and Data (National 3)

Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing the Manage Money and Data (National 3) Unit. They are intended for teachers and lecturers who are delivering this Unit. They should be read in conjunction with:

♦ the *Unit Specification*
♦ the *Course Specification*
♦ the *Course Support Notes*
♦ appropriate assessment support materials

General guidance on the Unit

Aims

The Manage Money and Data (National 3) Unit is a mandatory Unit in the National 3 Applications of Mathematics Course. The Manage Money and Data 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 the Manage Money and Data Unit at National 3 is to enable learners to apply their skills, knowledge and understanding of mathematics and numeracy to manage money and data in real-life contexts. Learners will build on their mathematical and numerical skills to determine factors affecting income and expenditure, budgeting and saving. Learners will also organise, present and interpret data based on real-life contexts.

Learners who successfully complete this Unit will be able to:

1   Manage money in basic real-life contexts
2   Manage data in basic real-life contexts

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.

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 the Unit

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

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

At this level, content and contexts for the development of skills, knowledge and understanding should be basic. This may include for example, familiar or routine situations for the learner or use of commonly available resources.

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:

♦ other Units in the National 3 Applications of Mathematics Course
♦ Managing Finance and Statistics (National 4) Unit
♦ Numeracy (National 4) Unit
♦ Core Skills: Numeracy (SCQF level 4)
♦ Personal Finance Award (SCQF level 4)
♦ National Certificate Group Awards
♦ further study, employment and/or training

The Manage Money and Data Unit has applications in a variety of other 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 such as physical education, home economics, geography, and business in addition to life and work contexts.

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.

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, investigative and problem solving approaches, cross-curricular approaches and resource based learning.

Examples of these approaches for this Unit are outlined in the table below. These examples also illustrate how the Assessment Standards can be integrated:

Interdisciplinary approaches	
Assessment Standards	**Suggested contexts for learning and teaching**
1.1 Identifying factors affecting income and expenditure 1.2 Preparing a simple budget 1.3 Developing a basic savings plan 1.4 Making a decision based on the best deal	Learners could be encouraged to produce a prioritised list of personal 'needs' and 'wants'. They could identify ways in which income could be generated to pay for them. Calculations could involve: basic pay with income tax deducted, pocket money, allowances, grants and gifts. Learners could investigate the cost of an item such as a pair of shoes or event they would like to attend. They could develop a savings plan for the item/event. Learners could be encouraged to use spreadsheets to organise the data. Learners could calculate amounts of money to be saved over a given period of time to cover the costs of the item or event. Use the Internet or other resources to investigate and source information about a chosen product. Given two pieces of information, eg cost and discounts, learners could compare two products to determine the best deal.
Investigative/problem solving approaches	
Assessment Standards	**Suggested contexts for learning and teaching**
1.1 Identifying factors affecting income and expenditure	Scenarios could be used to encourage learners to find out pay, and pay deductions for jobs or careers. Real-life materials, such as job advertisements could be used. Learners could identify the best deal in terms of basic salary and deductions.

| 1.4 Making a decision based on the best deal | Compare rates of pay for a variety of advertised jobs where some are quoted weekly, monthly or annually and calculate pay with bonuses where extra payment is given for producing more than a stated number of items. The best deal could be investigated.

Produce a scenario for two school leavers. One has secured a job at minimum wage for 35 hours a week and one is on job-seekers allowance. Ask the learners to:-

1. calculate the total income for each school leaver – taking into account deductions from pay
2. produce a table of expenses for a month for each school leaver including bills, clothes, food and travel
3. prepare a one year budget for each school leaver indicating potential or required savings
4. produce a savings plan for the next year for each school leaver showing the maximum savings possible
5. draw a graph to represent the savings
6. decide whether either of the school leavers could afford to pay for a holiday |

Cross-curricular approaches	
Assessment Standards	**Suggested contexts for learning and teaching**
2.1 Organising primary data

2.2 Carrying out simple calculations to compare data

2.3 Representing data in an appropriate format

2.4 Interpreting simple data to draw conclusions | Collaboration with the Physical Education department could provide an opportunity to collect, record, analyse, represent and interpret data. For example, comparing average times/number of repetitions and sets of exercises/total weight lifted/results from fitness tests/blood pressure and pulse rates between classes for various events. Displays of data could be generated and presented with a simple interpretation.

Collaboration with the Science department could provide the opportunity to collect, record, analyse, represent and interpret data from scientific experiments. The results could be discussed and conclusions drawn.

Geography could be used as a basis for conducting a survey about land use. Learners could collect and record data about land use from available resources, represent the data in graphical form and draw simple conclusions from what they have found out.

Another source of data could be the school canteen. Learners could record daily totals, totals by year group, trends over five days, does weather affect numbers, most popular meals etc. These results could be recorded, analysed and presented. |

	It is important that permission and cooperation is sought from the canteen beforehand.
Resource-based learning	
Assessment Standards	**Suggested contexts for learning and teaching**
2.2 Carrying out simple calculations to compare data 2.4 Interpreting simple data to draw conclusions 1.4 Making a decision based on the best deal 1.2 Preparing a simple budget	Learners could work with actual or simplified data from service providers such as utility companies, environmental services, eg solar panel installers, mobile phone providers, broadband providers, savings accounts and pay day loans etc. Opportunities could be given for learners to analyse the data, make comparisons by carrying out calculations and then drawing conclusions as to which provider or product would give the best deal. Based on the best deal identified, learners could be asked to prepare a simple budget to cover the costs of the product or service.

Combining and sequencing learning and teaching 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 exist:

Possible combinations/sequence	**Suggested approaches**
Outcomes 1 and 2 combined	In this approach, the money and data Outcomes could be combined. Learners could be given the opportunity to manage money by collecting, representing and interpreting financial data. For example, when identifying factors affecting income and expenditure, learners could collect and organise this data in the form of a table on a spreadsheet. Learners could also represent or interpret given financial data in the form of a bar graph showing the amount of money spent on different items in a given budget.
Outcomes 1 and 2 delivered sequentially	In this approach, the money and data Outcomes could be delivered sequentially and in any order. 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 Applications of 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.

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

For this Unit there are significant opportunities to develop the following skills for learning, skills for life and skills for work. Some of these opportunities are described in the table below:

SQA Skills for Learning, Skills for Life and Skills for Work framework definition	Suggested approaches for learning and teaching
Numeracy is the ability to use numbers to solve problems by counting, doing calculations, measuring, and understanding graphs and charts. This is also the ability to understand the results.	Throughout this Unit, learners will have the opportunity to use number and number processes to solve practical problems involving money. Learners will also have the opportunity to use numeracy when organising, presenting and interpreting data.
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 mathematics in contexts involving money and data. They will be able to select and apply appropriate mathematical processes and interpret data and the results of 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 mathematical problems in a range of real-life contexts. For example, learners could be encouraged to think about how they are going to tackle financial and data handling problems, decide which knowledge and skills to use and then carry out the processes and/or calculations to tackle a range of real-life situations.

There may also be 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 integrating assessment within this Unit.

The Manage Money and Data Unit can be assessed in a variety of ways and could include, for example:

♦ specific assessment tasks or activities
♦ practical assignments such as a project or investigation
♦ discrete tests

These approaches are not exhaustive and other possibilities also exist.

The following table gives some examples of how these approaches could be used within the Unit to provide a varied and integrated assessment experience. This integrated approach aims to make the assessment more coherent and meaningful for learners.

Approach to assessment	Outcomes	Examples of approaches to assessment
Project/ investigation	Outcome 1 Outcome 2	Learners could be given a case study or scenario, such as producing a budget for an event at school/college. This scenario could require learners to identify income and expenditure for the event such as a grant or ticket sales, and determining what supplies would need to be purchased in advance. Based on the supplies for the event, learners could determine the best deal for selected products or services, eg music, food or drink. Learners could compare costs, perform calculations and interpret given data. Learners could be asked to present their budget in an appropriate format and draw simple conclusions about what is affordable.
Assessment tasks/activities	Outcome 1 Outcome 2	Learners could be given a set of financial data such as savings rates or service tariffs for broadband contracts. Learners could be asked to carry out calculations to compare the data and then represent the data in a suitable graphical form to illustrate differences. Graphical forms produced by the learner could be accompanied by a brief interpretation of the data or a basic conclusion.

Discrete test or question paper	Outcome 1 Outcome 2	Learners could be given a test which consists of a mix of short and extended response questions. For Outcome 2 this may include questions on given financial data based on real-life contexts. The use of extended response questions could provide opportunities for assessing learners' ability to interpret financial data and draw conclusions.

The sequencing and integration of assessment for this Unit could also mirror the examples described in the section on 'Approaches to learning and teaching'.

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

It would normally be expected that considerable learning and teaching would have taken place prior to the collection of evidence for assessment purposes.

Evidence must be presented for all Outcomes and Assessment Standards for the Unit.

Further advice and guidance on assessment for the National 3 Applications of Mathematics Course and its components Units is contained within the *Course Support Notes.*

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 activities
♦ adapted equipment
♦ 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 learners and/or those with additional support needs) — various publications on SQA's website: www.sqa.org.uk/sqa//14977.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)
♦ *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*
♦ 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

Administrative information

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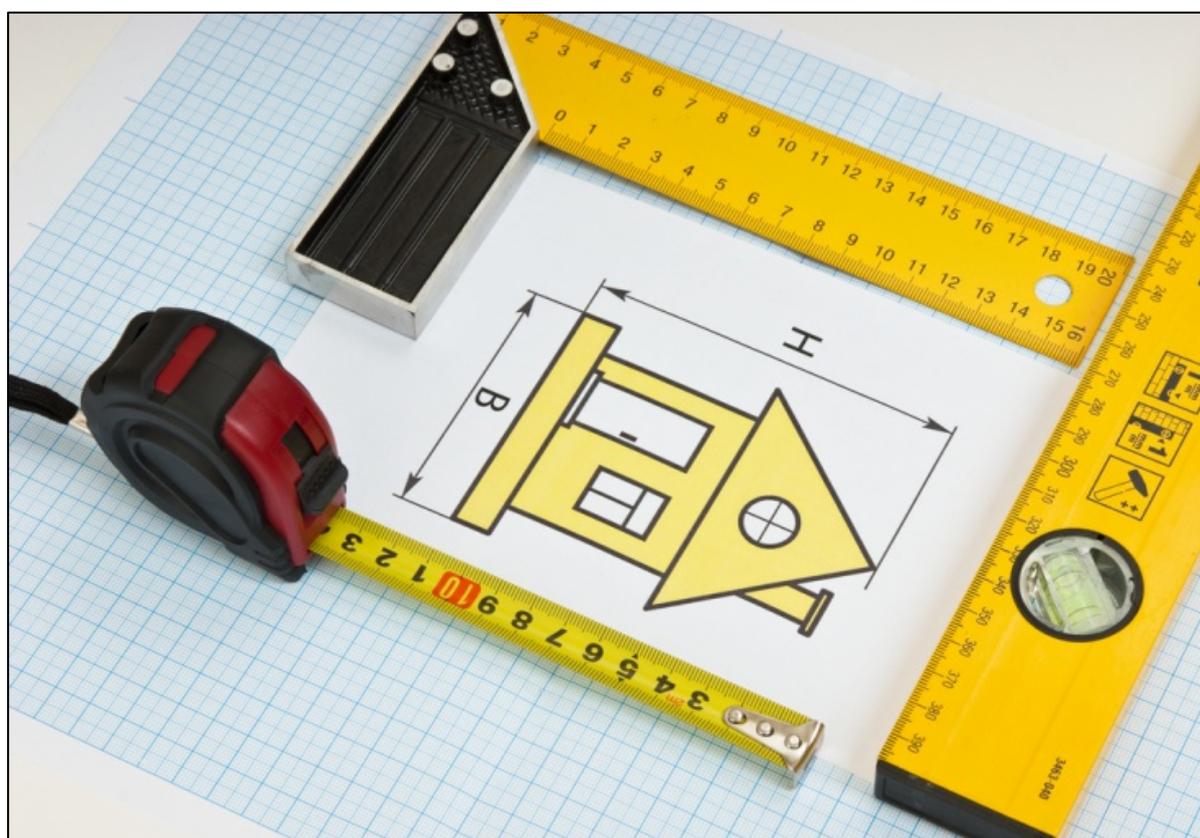
History of changes to Unit Support Notes

Course details	Version	Description of change	Authorised by	Date
	2.0	Lifeskills Mathematics changed to Applications of Mathematics	Qualifications Manager	October 2017

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Unit Support Notes — Applications of Mathematics: Shape, Space and Measures (National 3)

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

Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing the Shape, Space and Measures (National 3) Unit. They are intended for teachers and lecturers who are delivering this Unit. They should be read in conjunction with:

♦ the Unit Specification
♦ the Course Specification
♦ the Course Support Notes
♦ appropriate assessment support materials

General guidance on the Unit

Aims

The Shape, Space and Measures (National 3) Unit is a mandatory Unit in the National 3 Applications of Mathematics Course. The Shape, Space and Measures 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 enable learners to apply their skills, knowledge and understanding of shape, space and measures in real-life contexts. Learners will build on their mathematical and numerical skills by using measures and elementary geometry to tackle real-life situations.

Learners who successfully complete this Unit will be able to:

1   Use shape and space in basic real-life contexts
2   Use measures in basic real-life contexts

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.

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 the Unit

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

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

At this level, content and contexts for the development of skills, knowledge and understanding should be basic. This may include for example, familiar or routine situations for the learner or use commonly available resources.

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:

♦ other Units within the National 3 Applications of Mathematics Course
♦ Geometry and Measures (National 4) Unit
♦ Numeracy (National 4) Unit
♦ Core Skills: Numeracy (SCQF level 4)
♦ National Certificate Group Awards
♦ further study, employment and/or training

The Shape, Space and Measures Unit has applications in a variety of other 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 such as technology, art and geography in addition to life and work contexts.

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.

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, investigative and problem solving approaches, cross-curricular approaches and resource based learning.

Examples of these approaches for this Unit are outlined in the table below. These examples also illustrate how the Assessment Standards can be integrated:

Interdisciplinary learning	
Assessment Standards	**Suggested contexts for learning and teaching**

1.1 Calculating and using the perimeter and area of a regular 2D shape
 	
1.3 Giving or following directions
 	
1.4 Working with simple patterns
 	
2.1 Selecting and using appropriate units of measurement
 	
2.2 Stating and using simple formulae expressed in words or symbols
 	
2.4 Applying a basic scale factor
 	
2.5 Calculating time intervals to manage activities
	Provide learners with a scale drawing of a 'community centre' that shows the dimensions of each room – including a storage cupboard. Make sure that it is not just a basic rectangle and that it has at least four useable rooms and corridors between, with ceilings 4m high. Construct a scenario for a new youth/sports club that is to open in the centre.
	
	Ask learners to:
	  a) calculate the area of the largest room
	  b) calculate the perimeter of the largest room
	  c) calculate whether the largest room would be large enough for
	    i. football
	    ii. dancing
	    iii. badminton
	
	  d) work out how many chairs that are 40cm wide would fit around the walls of the hall
	  e) calculate the area of the smallest room, and decide how large it would become if the wall to the next room was removed. Has the area or perimeter been doubled?
	  f) write out a set of instructions to tell new members how to find their way into the large hall from the front door
	  g) design a new logo for the club using only rectangles/triangles/circles

	h) produce an evening timetable for the first week of the club, showing enough time for full dance sessions or badminton games. Include time for breaks and for clearing away at the end of the evening. Produce a wall display made up of regular 2D blocks with different dimensions. Interpret a scale drawing by calculating the area to ensure coverage of a given proportion of the wall. Apply basic scale factors to change the size of the basic block to accommodate different items of display, eg larger blocks for flowers, smaller blocks for seeds. Produce a timed plan for the display, calculating how long it would take to complete.

Investigative/problem solving approaches

Assessment Standards	Suggested contexts for learning and teaching
1.1 Calculating and using the perimeter and area of a regular 2D shape 1.3 Giving or following directions 2.1 Selecting and using appropriate units of measurement 2.2 Stating and using simple formulae expressed in words or symbols 2.3 Interpreting simple scale drawings 2.4 Applying a basic scale factor	Learners could be asked to interpret a scale drawing of a rectangular garden and use the drawing to: ♦ calculate the perimeter to work out how much fencing would be required using appropriate units and formulae ♦ calculate the area of a garden to work out how many square metres of lawn would be needed to cover it. Learners could calculate the area of the garden by counting squares or by using a simple formula and using appropriate units ♦ calculate different perimeters and areas of the same shaped garden when a basic scale factor is applied Learners could also be asked to landscape the garden by following a set of simple design instruction. A wall is to be tiled along the length and width of a bath. Ask learners to work with a scale drawing and given instructions to calculate the area to be titled, and how many tiles of a given size would be required.

Cross-curricular approaches

Assessment Standards	Suggested contexts for learning and teaching
1.2 Calculating and using the volume of a cuboid	Technology could be used to design and make a container in the shape of a cuboid that will hold 1000 cm^3 sand, eg 20 x 10 x 5, or 5 x 5 x 40 then work out the

	surface area of the 6 sides to find the container which can be built with the least amount of wood.
1.3 Giving or following directions	
1.4 Working with simple patterns 2.1 Selecting and using appropriate units of measurement 2.2 Stating and using simple formulae expressed in words or symbols	Home economics contexts could be used to determine the number of different cuboid shaped containers required to store the bulk item, eg sugar or flour. Learners could also measure the dimensions and volume of a 500g box of cereal. Ask the learners to increase the size by a factor of 2. What would be the new dimensions and volume? Would it hold twice as much cereal? Geography — consider using local maps and asking the learners to write directions from their house to the local takeaway/bus stop. Use appropriate units of measurement to estimate distances. Art and design — consider the use of repeated patterns in a fashion/art/design project and to discuss the use of shapes such as triangles, rectangles and circles in fashion/art/design.

Resource-based learning

Assessment Standards	Suggested contexts for learning and teaching
1.3 Giving or following directions 2.1 Selecting and using appropriate units of measurement 2.5 Calculating time intervals to manage activities	Plan a journey for a friend to a local destination. Give directions and use published time tables to calculate time intervals for buses or trains. Work out a departure time for a friend to meet with you at a particular time of day using appropriate units.

Combining and sequencing learning and teaching 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/sequences	Suggested approaches
Outcomes 1 and 2 combined	In this approach, the two Outcomes could be combined. Learners could be given the opportunity to apply their knowledge of measures whilst working with perimeters, area, volume and shape patterns. For example, learners could be asked to select and use appropriate units and formulae when calculating and using area of a regular 2D shape, they could also apply a basic scale factor to double or halve the area of the shape and interpret regular 2D shapes used in scale drawings. This approach would be particularly useful if a thematic or topic based approach to learning, teaching and assessment is adopted.

Assessment evidence could be collected for both Outcomes at the same time. |
| Outcomes 1 and 2 delivered sequentially | In this approach, the two Outcomes could be delivered sequentially and in any order. Some learners may, however, benefit from achieving Outcome 2 prior to Outcome 1 as this approach may reinforce the selection and use of units of measurement prior to their application in Outcome 1.

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 Applications of 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.

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

For this Unit there are significant opportunities to develop the following skills for learning, skills for life and skills for work, some of these opportunities are described in the table below:

SQA Skills for Learning, Skills for Life and Skills for Work framework definition	Suggested approaches for learning and teaching
Numeracy is the ability to use numbers to solve problems by counting, doing calculations, measuring, and understanding graphs and charts. This is also the ability to understand the results.	Throughout this Unit learners will have ample opportunities to: use number to solve problems arising in real-life contexts; solve practical problems involving shape and measurement using the skill of interpretation and performing calculations involving the four operations.
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 mathematics in contexts involving shape, space and measures. They will be able to select and apply appropriate mathematical processes and interpret shape and space, and the results of measurements 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 mathematical problems involving shape, space and measures in a range of real-life contexts. Learners could be encouraged to think about how they are going to tackle problems, decide which knowledge and skills to use and then carry out the calculations in order 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 integrating assessment within this Unit.

The Shape, Space and Measures Unit can be assessed in a variety of ways and could include, for example:

♦ specific assessment tasks or activities
♦ practical assignments such as a project or investigation
♦ discrete tests

These approaches are not exhaustive and other possibilities also exist.

The following table gives some examples of how these approaches could be used within the Unit to provide a varied and integrated assessment experience. This integrated approach aims to make the assessment more coherent and meaningful for learners.

Approach to assessment	Outcomes	Examples of approaches to assessment
Project/ investigation	Outcome 1 Outcome 2	Learners could be given a case study or scenario such as redecorating a room at home. This scenario could require learners to: ♦ produce a scale drawing of a room ♦ perform calculations to work out how much wallpaper would be required ♦ work with simple patterns to produce their own wallpaper ♦ calculate the volume of the room to work out the size of a new radiator based on given specifications ♦ estimate how long it would take to redecorate the room based on an 8 hour working day ♦ follow a set of given instructions to place new furniture ♦ apply a basic scale factor to calculations for the wallpaper for the same shaped room, twice the size
Assessment tasks/activities	Outcome 1 Outcome 2	Learners could be given a product to make packaging for. Learners would need to follow given instructions to make packaging of various sizes by applying a basic scale factor. Learners could also use their knowledge of patterns to decorate their packaging for marketing purposes.

		Time plans could be created to manage a range of activities involving shape, space and measures, eg time planning a technology task, an art task or a practical task involving the measurement of different areas around the school or college.
Discrete test or question paper	Outcome 1 Outcome 2	Learners could be given a test which consists of short response and extended response questions. Short response questions could focus on questions for each assessment standard. Extended responses could provide opportunities for assessing learners' ability to interpret and use shape, space and measures in contexts which combine assessment standards.

The sequencing and integration of assessment for this Unit could also mirror the examples described in the section on 'Approaches to learning and teaching'.

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

It would normally be expected that considerable learning and teaching would have taken place prior to the collection of evidence for assessment purposes.

Further advice and guidance on assessment for the National 3 Applications of Mathematics Course and its components Units is contained within the *Course Support Notes.*

Evidence must be presented for all Outcomes and Assessment Standards for the Unit.

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 activities
♦ 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 learners and/or those with additional support needs) — various publications are available on SQA's website at: www.sqa.org.uk/sqa//14977.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)
♦ *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*
♦ 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

Administrative information

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History of changes to Unit Support Notes

Course details	Version	Description of change	Authorised by	Date
	1.1	Pages 44 and 46 — typographical error corrected: Assessment Standard 1.3 changed from 'Giving or following instructions' to 'Giving and following directions'.	Qualifications Manager	May 2014
	2.0	Lifeskills Mathematics changed to Applications of Mathematics	Qualifications Manager	October 2017

Unit Support Notes — Numeracy (National 3)

Unit Support Notes for the Numeracy Unit are available on the [Literacy and Numeracy page](#) of SQA's website.

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