



## Ascentis Level 3 Award in

## Mathematics for Numeracy Teaching

## Specification

**Ofqual Number:** 600/3545/6

Ofqual Start Date: 01/11/2011

Ofqual Review Date: 31/07/2020

Ofqual Certification Review Date: 31/07/2021

## ABOUT ASCENTIS

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Ascentis was originally established in 1975 as OCNW, a co-operative scheme between Universities and Colleges of Further Education. Ascentis was the first 'Open College' in the UK and served the needs of its members for over 34 years. Throughout this period, OCNW grew yet maintained its independence in order that it could continue to respond to the requirements of its customers and provide a consistently high standard of service to all centres across the country and in recent years to its increasing cohorts of overseas learners.

In 2009 OCNW became Ascentis - a company limited by guarantee and a registered educational charity.

**Ascentis** is distinctive and unusual in that it is both:

- **An Awarding Organisation** regulated by the Office of Qualifications and Examinations Regulation (Ofqual)

and

- **an Access Validating Agency (AVA)** for 'Access to HE Programmes' licensed by the Quality Assurance Agency for Higher Education (QAA).

Ascentis is therefore able to offer a comprehensive ladder of opportunities to centres and their students, including Foundation Learning, vocational programmes and progressing to QAA recognised Access to HE qualifications. The flexible and adult-friendly ethos of Ascentis has resulted in centres throughout the UK choosing to run its qualifications.

## ASCENTIS CONTACT DETAILS

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# ASCENTIS LEVEL 3 AWARD IN MATHEMATICS FOR NUMERACY TEACHING

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## Introduction

This qualification will evidence achievement of the entry criteria for subject specific numeracy teacher education programmes. The entry criteria were developed by Lifelong Learning UK to ensure that trainee teachers have an appropriate level of personal skills in Mathematics to benefit from a subject specific teacher training programme. The entry criteria, first introduced in 2007, were revised in 2010 and are available on the LSIS website.

The entry criteria detail the skills in Mathematics that need to be evidenced at Level 3. These skills can be evidenced in a number of ways on entry to a subject specific teacher education programme – most commonly through an initial assessment but also by holding an appropriate qualification, or other evidence provided by the prospective trainee. **All of these opportunities to evidence personal skills continue to be available.** These qualifications have been developed in response to sector demand for a specific qualification to be developed. They are of particular value for those providers who offer 'bridging' programmes to support prospective trainees to develop the skills they need.

**The Ascentis Assessments and Work Solutions Booklet could also be used as a method of initial assessment and is available via the Ascentis on-line portal.**

Contact Ascentis development team for further information on [development@ascentis.co.uk](mailto:development@ascentis.co.uk).

There are several features of this qualification that make it very appropriate for its target learners:

- Unit certification is available for each of the units
- Verification and certification can be offered throughout the year, allowing maximum flexibility for centres
- Ascentis-devised assessment task designed to cover all the assessment criteria within the units
- Assessment tasks designed to be holistic and relevant to learners working or intending to work within a wider range of learning environments in the Lifelong Learning sector

## Aims

The aim of the award is to evidence achievement of the entry criteria for subject specific Mathematics for Numeracy teacher education programmes.

- 1 Using mathematics: academic subjects
- 2 Using mathematics: professional and vocational contexts
- 3 Using mathematics: personal and public life

## Target Group

The awards are aimed at any pre-service or in-service learner. They are of particular value for those providers who offer 'bridging' programmes to support prospective trainees to develop the skills they need.

**Ofqual Qualification Number:** 600/3545/6

## Rules of Combination

To be awarded this qualification the learner must achieve a total of 12 credits from the optional units available.

Ascentis Level 3 Award in Mathematics for Numeracy Teaching				
Maximum credits: 12				
Group A - Optional Units				
Credit (from Group A) Optional Units: 12				
Title	Level	Credit Value	GLH	Unit ref
Using Mathematics: Academic Subjects	3	6	30	T/503/4861
Using Mathematics: Professional and Vocational Contexts	3	6	30	A/503/4859
Using Mathematics: Personal and Public Life	3	6	30	F/503/4863
Credits from equivalent Units: Please contact the Ascentis office to request equivalences, and ask to speak to a member of the Qualifications Development Team.				
Credits from exemptions: Please contact the Ascentis office to request exemptions and ask to speak to a member of the Qualifications Development Team.				

Unit certification is available for all units.

## Recommended Guided Learning Hours

The recommended guided learning hours for this qualification is 60.

## Total Qualification Time

The total qualification time for the Level 3 Award in Mathematics for numeracy Teaching is 120.

## Time Limit for the Process of Credit Accumulation and Exemptions

Credit accumulation is usually within the life span of the qualification.

## Recommended Prior Knowledge, Attainment and / or Experience

As part of the selection process for entry on to the course all potential entrants must be interviewed. There are no formal entry requirements, but there must be confidence that an applicant's numeracy skills are at a standard in order to be able to progress to the study of these skills at Level 3.

## Age Range of Qualification

These qualifications are listed as being appropriate for learners of 16 - 18 and 19+.

## Teaching Practice

There is **no** requirement to undertake any practical teaching.

## Opportunities for Progression

- Learners who have achieved the Level 3 Award in Mathematics for Numeracy Teaching could progress to the Level 5 Diploma in Teaching Mathematics: Numeracy
- Learners could also undertake this qualification as a lead into the Level 3 Award in Education and Training qualification the Level 4, Certificate in Education and Training or the Level 5 Diploma in Education and Training
- This qualification could also be studied concurrently with a teaching qualification

## Mapping / Relationship to National Occupational Standards

The units of assessment for the award were written by LSIS, based on LSIS overarching professional standards for teachers, tutors and trainers in the Lifelong Learning Sector (2007) and mapped to National Occupational Standards for Learning and Development (2010).

## Centre Recognition

This qualification can only be offered by centres recognised by Ascentis and approved to run this qualification. Details of the centre recognition and qualification approval process are available from the Ascentis office (tel. 01524 845046) or from the website at [www.ascentis.co.uk](http://www.ascentis.co.uk).

## Qualification Approval

If your centre is already a recognised centre, you will need to complete and submit a qualification approval form to deliver this qualification. Details of the qualification approval process are available from the Ascentis office (tel. 01524 845046) or from the website at [www.ascentis.co.uk](http://www.ascentis.co.uk).

## Registration

All learners must normally be registered with Ascentis within seven weeks of commencement of a course via the Ascentis electronic registration portal.

## Status in England, Wales and Northern Ireland

This qualification is available in England, Wales and Northern Ireland. It is only offered in English. If a centre based overseas (including Scotland) would like to offer this qualification, they should make an enquiry to Ascentis.

## Reasonable Adjustments and Special Considerations

In the development of this qualification Ascentis has made every attempt to ensure that there are no unnecessary barriers to achievement. For learners with particular requirements reasonable adjustments may be made in order that they can have fair assessment and demonstrate attainment. There are also arrangements for special consideration for any learner suffering illness, injury or indisposition. Full details of the reasonable adjustments and special considerations are available from the Resources/Key Documents area of the Ascentis website [www.ascentis.co.uk](http://www.ascentis.co.uk) or through contacting the Ascentis office.

## Enquiries and Appeals Procedure

Ascentis has an appeals procedure in accordance with the regulatory arrangements in the Ofqual *General Conditions of Recognition*<sup>1</sup>. Full details of this procedure, including how to make an application, are available from the Resources/Key Documents area of the Ascentis website [www.ascentis.co.uk](http://www.ascentis.co.uk) or through contacting the Ascentis office.

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<sup>1</sup> The Scottish Qualifications Authority (SQA) have developed some high level principles that cover the same requirements as the Ofqual Conditions. These are the SQA Accreditation Regulatory Principles (2011).

## ASSESSMENT AND VERIFICATION ARRANGEMENTS

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### Assessment

All units are internally assessed through the learner completing Ascentis assignments that covers the relevant assessment criteria, internally assessed and verified by the centre and then externally verified by Ascentis.

**There is one assignment per unit. These are available via the Ascentis electronic registration portal. To achieve the full qualification, learners should complete two assignments chosen from assignments 1, 2 and 3 depending on the optional units chosen.**

On completion of the learners' evidence for either the individual units or the Award in Mathematics for Numeracy Teaching, the assessor is required to complete the Summary Record of Achievement for each learner. The Summary Record of Achievement asks assessors and the internal verifier to confirm that the rules of combination have been followed. The Summary Record of Achievement form is provided in Appendix 1.

The tutor/assessor must be confident that the work is the learner's own work. The Authenticity Cover Sheet includes a statement on authentication which needs to be signed by both the learner and assessor. This can be found in Appendix 7.

Centres are required to retain all evidence from all learners for external verification and for 4 weeks afterwards should any appeal be made.

If the learner fails to meet the assessment criteria on the first attempt at an activity they may redraft the work following feedback given by the tutor. However tutors must not correct the work of the learner, and all feedback given by the tutor must be included within the learner's evidence.

Learners' work should include a tracking sheet to show where the evidence for each assessment criteria is to be found. Some activities could produce evidence for more than one unit, which is acceptable as long as there is clear reference to this on the tracking sheet. Examples of tracking sheets are found in Appendix 3.

**Note: The Assessment and Sample Solutions Booklet will be made available via the Ascentis electronic registration portal, once learners have been registered against the qualification. Sample questions are available in Appendix 5.**

### Verification

#### Internal Verification

Internal verification is the process of ensuring that everyone who assesses a particular unit in a centre is assessing to the same standards. Internal verification of this programme will be co-ordinated by a named co-ordinator at each centre, who will liaise with Ascentis. The co-ordinator may also act as the internal verifier. Internal verification will be carried out through standardisation activities including the internal verification of portfolios evidence across all the groups of students, to include all the assessors and the full range of units. It is the responsibility of Internal Verifiers to ensure that assessors' decisions are sampled and monitored throughout the qualification to ensure consistency and fairness. Internal Verifiers are also responsible for supporting assessors by offering advice and guidance. Further information is available from the Resources/Key Documents area of the Ascentis website [www.ascentis.co.uk](http://www.ascentis.co.uk) or through contacting the Ascentis office.

Ascentis External Verifiers will confirm the Internal Verification activities at their visit.

## External Verification

Recognised centres will be visited in accordance with a verification model that is considered most appropriate for the provision. More frequent verifications can be requested from the Ascentis Quality Assurance team, for which there is usually an additional charge. External verification will usually focus on the following areas:

- A review of the centres management of the regulated provision
- The levels of resources to support the delivery of the qualification, including both physical resources and staffing
- Ensuring the centre is using appropriate assessment methods and making appropriate assessment decisions according to Ascentis' requirements
- Ensuring the centre has appropriate internal quality assurance arrangements as outlined within the relevant qualification specification
- Checking that the centre is using appropriate administrative arrangements to support the function of delivery and assessment

External Verifiers will usually do this through discussion with the centre management team; assessment and Internal Quality Assurance staff; verifying a sample of learners' evidence; talking to learners, reviewing relevant centre documentation and systems.

## Knowledge, Understanding and Skills required of Assessors and Internal Verifiers

Those delivering and assessing this qualification should be qualified teachers or working towards a teaching qualification together with Numeracy skills at Level 4 or above. Those carrying out internal verification should have the knowledge and understanding and skills required for those delivering and assessing the qualification. In addition they should be familiar with the requirements of the internal verification process.

Training for this role is available through an Ascentis Internal Quality Assurance course. The purpose of the course is to provide staff in centres with knowledge and understanding of Ascentis IQA processes and procedures, which will enable them to carry out their role more effectively. To book your place on a course or request further information, please contact the Ascentis Quality Assurance Team ([qualityassurance@ascentis.co.uk](mailto:qualityassurance@ascentis.co.uk)).

## UNIT SPECIFICATIONS

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### Unit 1 Using Mathematics: Academic Subjects

**Credit Value of Unit: 6**

**GLH of Unit: 30**

**Level of Unit: 3**

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#### Introduction

The unit aims to provide learners with the opportunity to develop knowledge and skills relating to the LLUK Criteria for entry to Mathematics (Numeracy) Teacher Training in the Lifelong Learning Sector (LLUK 2007 amended Feb 2010). Learners will interpret mathematical situations, process problems, analyse mathematical findings and use mathematical communication in academic subjects.

Learning Outcomes	Assessment Criteria
The learner will be able to	The learner can
1 Be able to interpret mathematical situations in academic subjects	1.1 Explain the role of models in representing mathematical situations
	1.2 Analyse situations to interrogate for mathematical information and problems in academic subjects
	1.3 Select mathematical methods, operations and tools to extract mathematical information from problem based contexts in academic subjects
2 Be able to process mathematical problems in academic subjects	2.1 Analyse mathematical procedures for efficiency and effectiveness
	2.2 Examine linear and non-linear mathematical patterns in academic subjects
	2.3 Change values and assumptions when investigating mathematical situations in academic subjects
	2.4 Use extended logic and multi-step structured processes to find mathematical solutions in academic subjects
3 Be able to analyse mathematical findings from academic subjects	3.1 Analyse the effect of accuracy on the reliability of mathematical findings in academic subjects
	3.2 Interrogate mathematical conclusions for errors or misconceptions
	3.3 Interpret findings to draw conclusions in academic subjects
4 Be able to use mathematical communication in academic subjects	4.1 Select mathematical language for debate in academic subjects
	4.2 Select mathematical communication techniques to suit audience
	4.3 Present mathematical processing and analysis
	4.4 Describe findings using mathematical communication skills in academic subjects

#### Tutor Guidance for Unit

Please note that this unit also appears in the following Ascentis qualifications

- **Level 4 Certificate in Education and Training**

#### Assessment Method for Unit

Please note that this unit is assessed by the learner completing an Ascentis set assignment.

## UNIT SPECIFICATIONS

### Unit 2 Using Mathematics: Personal and Public Life

**Credit Value of Unit: 6**

**GLH of Unit: 30**

**Level of Unit: 3**

#### Introduction

The unit aims to provide learners with the opportunity to develop knowledge and skills relating to the LLUK Criteria for entry to Mathematics (Numeracy) Teacher Training in the Lifelong Learning Sector (LLUK 2007 amended Feb 2010). Learners will interpret mathematical situations, process problems, analyse mathematical findings and use mathematical communication in personal and public life.

Learning Outcomes	Assessment Criteria
The learner will be able to	The learner can
1 Be able to interpret mathematical situations in personal and public life	1.1 Explain the role of models in representing mathematical situations 1.2 Analyse situations to interrogate for mathematical information and problems in personal and public life 1.3 Select mathematical methods, operations and tools to extract mathematical information from problem based contexts in personal and public life
2 Be able to process mathematical problems in personal and public life	2.1 Analyse mathematical procedures for efficiency and effectiveness 2.2 Examine linear and non-linear mathematical patterns in personal and public life 2.3 Change values and assumptions when investigating mathematical situations in personal and public life 2.4 Use extended logic and multi-step structured processes to find mathematical solutions in personal and public life
3 Be able to analyse mathematical findings from personal and public life	3.1 Analyse the effect of accuracy on the reliability of mathematical findings in personal and public life 3.2 Interrogate mathematical conclusions for errors or misconceptions 3.3 Interpret findings to draw conclusions in personal and public life
4 Be able to use mathematical communication in personal and public life	4.1 Select mathematical language for debate in personal and public life 4.2 Select mathematical communication techniques to suit audience 4.3 Present mathematical processing and analysis 4.4 Describe findings using mathematical communication skills in personal and public life

#### Tutor Guidance

Please note that this unit also appears in the following Ascentis qualifications

- **Level 4 Certificate in Education and Training**

#### Assessment method for Unit

Please note that this unit is assessed by the learner completing an Ascentis set assignment.

## UNIT SPECIFICATIONS

### Unit 3 Using Mathematics: Professional and Vocational Contexts

Credit Value of Unit: 6

GLH of Unit: 30

Level of Unit: 3

#### Introduction

The unit aims to provide learners with the opportunity to develop knowledge and skills relating to the LLUK Criteria for entry to Mathematics (Numeracy) Teacher Training in the Lifelong Learning Sector (LLUK 2007 amended Feb 2010). Learners will interpret mathematical situations, process problems, analyse mathematical findings and use mathematical communication in professional and vocational contexts.

Learning Outcomes	Assessment Criteria
The learner will be able to	The learner can
1 Be able to interpret mathematical situations in professional and vocational contexts	1.1 Explain the role of models in representing mathematical situations
	1.2 Analyse situations to interrogate for mathematical information and problems in professional and vocational contexts
	1.3 Select mathematical methods, operations and tools to extract mathematical information from problem based contexts in professional and vocational contexts
2 Be able to process mathematical problems in professional and vocational contexts	2.1 Analyse mathematical procedures for efficiency and effectiveness
	2.2 Examine linear and non-linear mathematical patterns in professional and vocational contexts
	2.3 Change values and assumptions when investigating mathematical situations in professional and vocational contexts
	2.4 Use extended logic and multi-step structured processes to find mathematical solutions in professional and vocational contexts
3 Be able to analyse mathematical findings from professional and vocational contexts	3.1 Analyse the effect of accuracy on the reliability of mathematical findings in professional and vocational contexts
	3.2 Interrogate mathematical conclusions for errors or misconceptions
	3.3 Interpret findings to draw conclusions in professional and vocational contexts
4 Be able to use mathematical communication in professional and vocational contexts	4.1 Select mathematical language for debate in professional and vocational contexts
	4.2 Select mathematical communication techniques to suit audience
	4.3 Present mathematical processing and analysis
	4.4 Describe findings using mathematical communication skills in professional and vocational contexts

#### Tutor Guidance

Please note that this unit also appears in the following Ascentis qualifications

- **Level 4 Certificate in Education and Training**

#### Assessment method for Unit

Please note that this unit is assessed by the learner completing an Ascentis set assignment.

## Indicative Content for the Level 3 Award in Mathematics for Numeracy Teaching

### Units 1, 2 and 3

- The nature of number and developing the ability to read, write and represent numbers and numerical relationships in a variety of ways
- The place value system, expanded notation and practical application of number theory (concepts of factors, multiples, order relations and order of operations)
- Computing with whole numbers, integers, fractions, decimals and percentages using appropriate algorithms and a variety of techniques (mental computation, pencil and paper, calculator and computer methods)
- Converting between percentages, fractions and decimals; manipulating fractions, decimals and percentages
- Calculating proportional change
- Skills to estimate sums, differences, products and quotients
- Manipulating and calculating squares and square roots and numbers expressed in standard notation
- Mathematical information presented as standard compound measures and units, common powers and roots, and graphs (including graphs with several graph lines on the same set of axes)
- Understanding and creating two and three part ratios, calculating ratios and reducing ratios to lower terms and establishing rates from ratio
- Interpreting representations of scale such as drawings and maps to establish actual dimensions
- Conversion of measurements between common scales
- Creating scale drawings using appropriate measurements
- Using exact and estimate measurements to describe and compare phenomena
- Calculating perimeter and area measurements (squares, rectangles, and parallelograms including rhombus, trapezoids, and triangles)
- Establishing measurements (circumference, area, radius and diameter) for a circle from known variables
- Basic sampling techniques and sampling distributions. Tabulation techniques, and creating and interpreting charts and graphs. This should involve constructing, reading and interpreting tables, charts and graphs
- Probability: limited to an understanding of the basic expressions and forms of representation of chance (e.g. tree diagrams) and the associated terminology
- Data transformation, curve fitting, measures of centre and dispersion. Measures of location and spread would include: raw and grouped data; discrete and continuous data; mean, median and mode; upper and lower quartiles, inter-quartile range, and standard deviation
- Statistical diagrams: histograms, pie charts, frequency polygons, cumulative frequency diagrams, scatter diagrams
- Correlation: ideas of positive correlation, negative correlation and no correlation; correlation coefficient
- Regression: understanding ideas of equation for line of best fit; drawing regression lines on scatter plots; assessing how well a regression line fits the observed data
- Estimation techniques, inverse operations, sense of magnitude
- Use of calculators to find: mean, standard deviation, sum of values, correlation co-efficient, linear regression co-efficient. Use of spreadsheets to record data in tables; calculate values from data; plot graphs; draw statistical diagrams; calculate statistical measures
- Appropriate formulae to solve practical problems such as perimeters, areas and volumes.
- Rearrangement of basic algebraic expressions: collecting terms, expanding brackets and extracting common factors and finding the value of an unknown
- Solving simultaneous linear equations with two variables using appropriate algebraic techniques
  - Rearrangement of quadratic functions and trigonometric equations
  - Use of trigonometry and Pythagoras' Theorem to solve practical problems

## **Assignments**

**There are three assignments, one per unit.**

Learners completing the full qualification should complete two assignments chosen from assignments **1, 2 and 3** depending on the optional units chosen.

**Note: The Assessment and Sample Solutions Booklet will be made available via the Ascentis electronic registration portal once learners have been registered against the qualification.**

**The Ascentis Assessments and Sample Solutions could also be used as a method of initial assessment for the Level 5 Diploma in Education and Training or the Level 5 Diploma in Teaching Mathematics: Numeracy and is available via the Ascentis electronic portal.**

**Contact the Ascentis Development team for further information on [development@ascentis.co.uk](mailto:development@ascentis.co.uk).**

Summary Record of Achievement  
Level 3 Award in Mathematics for Numeracy Teaching

Unit Title	Level	Credit Value	Date completed	Assessor Signature	Internal Verifier Signature (if sampled)
Using Mathematics: Academic Subjects					
Using Mathematics: Personal and Public Life					
Using Mathematics: Professional and Vocational Contexts					

Learner Name \_\_\_\_\_

Minimum Credit Value of Qualification: 12

**I confirm that the minimum number of credits at the appropriate level have been achieved in order for a claim for certification to be made. I can confirm that the credit has been achieved from the correct combination of mandatory and optional units as specified within the Rules of Combination.**

Assessor Signature \_\_\_\_\_

Internal Verifier Signature (if sampled) \_\_\_\_\_

## Assignment Guidance

### Assignments 1, 2 and 3

Learners will need to complete two of these three assignments in order to gain the full qualification.

These assignments take the form of a written question with mathematical examples and extended written mathematical questions to be completed on an individual basis. It is not intended that these assignments are carried out in the classroom under timed conditions but completed by the learner in their own time and submitted to the tutor for marking once completed.

Each assignment contains four questions and these could be completed and submitted separately or together. There are detailed example solutions for the mathematical questions available to tutors as guidance on the depth and level of solutions expected. However, these are not intended as definitive answers due to the open nature of some of the questions.

There is no 'pass mark' for these assignments but learners do have to meet all the criteria. They have two submissions in which to do this.

As the assessment criteria are virtually identical in all three optional units (apart from the context), this allows for assessors to take a holistic view of how these criteria have been met. For example, if a learner is border line in meeting one of the criteria in one optional unit, this can be weighed against a stronger performance for the equivalent criteria in the other optional unit.

### Written mathematical assignments

Evidence should include for each optional unit

- First submission of mathematical assignment
- Mathematical examples of modelling that may have been referred to in assignment
- Copies of research notes and examples for assignment
- Completed tracking sheet showing where learner has met each criteria
- Feedback from tutor giving details of any criteria not met (**NB: work must not be corrected by tutor**)
- Final submission showing clearly how all criteria have now been met

## Tracking Sheet

## Unit 1: Using Mathematics: Academic Subjects

Criteria	Assessment Method	Evidence Details	Portfolio Reference	Completion Date
1.1 Explain the role of models in representing mathematic situations				
1.2 Analyse situations to interrogate for mathematical information and problems in academic subjects				
1.3 Select mathematical methods, operations and tools to extract mathematical information from problem based contexts in academic subjects				
2.1 Analyse mathematical procedures for efficiency and effectiveness				
2.2 Examine linear and non-linear mathematical situations in academic subjects				
2.3 Change values and assumptions when investigating mathematical situations in academic subjects				
2.4 Use extended logic and multi-step structured processes to find mathematical solutions in academic subjects				
3.1 Analyse the effect of accuracy on the reliability of mathematical findings in academic subjects				
3.2 Interrogate mathematical conclusions for errors or misconceptions				
3.3 Interpret findings to draw conclusions in academic subjects				
4.1 Select mathematical language for debate in academic subjects				
4.2 Select mathematical communication techniques to suit audience				
4.3 Present mathematical processing and analysis				
4.4 Describe findings using mathematical communication skills in academic subjects				

**The above evidence has been assessed against the standards and has been judged for validity, authenticity, currency, reliability and sufficiency.**

Learner Signature \_\_\_\_\_ Date \_\_\_\_\_

Assessor Signature \_\_\_\_\_ Date \_\_\_\_\_

Internal Verifier (if sampled) \_\_\_\_\_ Date \_\_\_\_\_

## Tracking Sheet

## Unit 2: Using Mathematics: Personal and Public Life

Criteria	Assessment Method	Evidence Details	Portfolio Reference	Completion Date
1.1 Explain the role of models in representing mathematic situations				
1.2 Analyse situations to interrogate for mathematical information and problems in personal and public life				
1.3 Select mathematical methods, operations and tools to extract mathematical information from problem based contexts in personal and public life				
2.1 Analyse mathematical procedures for efficiency and effectiveness				
2.2 Examine linear and non-linear mathematical situations in personal and public life				
2.3 Change values and assumptions when investigating mathematical situations in personal and public life				
2.4 Use extended logic and multi-step structured processes to find mathematical solutions in personal and public life				
3.1 Analyse the effect of accuracy on the reliability of mathematical findings in personal and public life				
3.2 Interrogate mathematical conclusions for errors or misconceptions				
3.3 Interpret findings to draw conclusions in personal or public life				
4.1 Select mathematical language for debate in personal or public life				
4.2 Select mathematical communication techniques to suit audience				
4.3 Present mathematical processing and analysis				
4.4 Describe findings using mathematical communication skills in personal or public life				

The above evidence has been assessed against the standards and has been judged for validity, authenticity, currency, reliability and sufficiency.

Learner Signature \_\_\_\_\_ Date \_\_\_\_\_

Assessor Signature \_\_\_\_\_ Date \_\_\_\_\_

Internal Verifier (if sampled) \_\_\_\_\_ Date \_\_\_\_\_

## Tracking Sheet

## Unit 3: Using Mathematics: Professional and Vocational Contexts

Criteria	Assessment Method	Evidence Details	Portfolio Reference	Completion Date
1.1 Explain the role of models in representing mathematic situations				
1.2 Analyse situations to interrogate for mathematical information and problems in professional and vocational contexts				
1.3 Select mathematical methods, operations and tools to extract mathematical information from problem based contexts in professional and vocational contexts				
2.1 Analyse mathematical procedures for efficiency and effectiveness				
2.2 Examine linear and non-linear mathematical situations in professional and vocational contexts				
2.3 Change values and assumptions when investigating mathematical situations in professional and vocational contexts				
2.4 Use extended logic and multi-step structured processes to find mathematical solutions in professional and vocational contexts				
3.1 Analyse the effect of accuracy on the reliability of mathematical findings in professional and vocational contexts				
3.2 Interrogate mathematical conclusions for errors or misconceptions				
3.3 Interpret findings to draw conclusions in professional and vocational contexts				
4.1 Select mathematical language for debate in professional and vocational contexts				
4.2 Select mathematical communication techniques to suit audience				

4.3 Present mathematical processing and analysis				
4.4 Describe findings using mathematical communication skills in professional and vocational contexts				

**The above evidence has been assessed against the standards and has been judged for validity, authenticity, currency, reliability and sufficiency.**

Learner Signature \_\_\_\_\_ Date \_\_\_\_\_

Assessor Signature \_\_\_\_\_ Date \_\_\_\_\_

Internal Verifier (if sampled) \_\_\_\_\_ Date \_\_\_\_\_

## Glossary

This table gives definitions for each of the acronyms found in this document

Acronym	Definition
AB	Awarding Body
AO	Awarding organisation
Credit	One credit equates to ten notional hours of learning
GLH	Guided Learning Hours (as defined by the Skills Funding Agency)
HEI	Higher education institution
LLUK	Lifelong Learning UK
LSIS	Learning and Skills Improvement Service
QCF	Qualifications and Credit Framework
ROC	Rules of Combination

### Level 3 Award in Mathematics for Numeracy Teaching 'Bridging' Qualification

Once learners have been registered against the qualification the Assessment and Sample Solutions Booklet will be made available via the Ascentis online portal. However, sample questions have been provided below. Solutions to sample questions have not been provided, in order to let you work through the questions systematically yourselves.

#### Sample Questions

##### Statistical Distributions

Applicants for a certain job are given an aptitude test. Past experience shows that the scores from the test are normally distributed with a mean of 60 and standard deviation of 12 marks.

- What percentage of applicants would be expected to pass the test if the minimum score required was 75?
- What would the pass mark need to be if the company wanted only 4% of applicants to pass?
- What would be the percentage failing if the standard deviation were 20 points?
- What practical use could the company make of this information?

##### Correlation and Regression

The number of customers in different regions and the corresponding monthly sales of a product are

Sales Region	1	2	3	4	5	6	7	8	9	10
No. of Customers (00s)	26	22	50	43	48	32	30	34	40	50
Sales Volume (£000s)	146	149	325	252	312	188	195	196	260	298

- Plot a scatter diagram of 'Sales Volume' against 'Number of customers'
- Calculate the regression line and the coefficient of determination  $r^2$
- Check your answers to b) in ONE way by using Excel functions or its Regression facility
- Plot the regression line on the same graph as the scatter diagram

What information does the coefficient of determination give you about the regression line?

Comment on the match between the data-points and the regression line. Is this consistent with the  $r^2$  value?

- Use the regression line to predict 'Sales Volume' for Regions having 1000, 4000 and 7000 customers. In each case comment critically on the reliability of these predictions

##### Algebra

A local company pays an hourly rate of £7.50. If  $x_n$  is the number of hours worked per week and  $y_n$  is the total wage for the week:

- Write down an equation relating hours worked to total wage
- Draw a graph of your equation
- If employee 1 worked 37 hours one week, use your graph to calculate their weekly wage. If employee 2 worked 20 hours one week, calculate the weekly wage in this case

- d) The company is taken over and both employee 1 and 2 are to be made redundant. The redundancy pay is found by multiplying their last week's wage by the number of hours worked in that last week. Use your answer to a) to write down an equation for calculating redundancy pay
- e) What would employee 1 and 2 receive in redundancy pay?
- f) Evaluate the importance of each of your algebraic equations. Give other examples of algebraic equations used in the work environment and evaluate their importance

Another local company pays an annual salary of £13,000 at the lowest scale and £14,500 at the highest scale.

- g) What fraction of the higher salary is the lower salary?
- h) If the lower salary is increased to £13,450, what is the percentage increase?

### Areas and Volumes

Workmen are digging a ditch which is to be 30m long and 1.25m deep. The cross-section is a symmetrical trapezium. The ditch must be 1.5m wide at the bottom and 2.5m wide at the top.

- a) Draw and label a diagram of the cross-section
- b) Find the area of the cross-section
- c) Calculate how many cubic metres of dirt are to be excavated from the ditch

The workmen use an excavator and the dirt is taken away in Lorries that can take  $12\text{m}^3$  at a time

- d) How many full loads of dirt are taken away?
- e) The last lorry is only partially filled up. What fraction of a full load does the last lorry take?

### Statistics

In April 2011 a survey of customer transaction values was carried out by a retail business. The following data was collected

Transaction value (£'s)	No. of customers
Below 10.00	137
10.00 to 19.99	259
20.00 to 29.99	297
30.00 to 39.99	378
40.00 to 49.99	193
50.00 to 59.99	84
60.00 to 69.99	52

- a) (i) Plot the histogram and the Cumulative Frequency Curve for this data  
(ii) Estimate the median transaction value and its Inter-quartile range from the graphs.
- b) For the above data calculate
  - (i) The mean transaction value (stating clearly any assumptions made)
  - (ii) The standard deviation
- c) A similar survey was carried out in October 2010. The resulting data gave a mean value of £27.90 and a standard deviation of £14.30.

Comment on how the spending pattern of customers has changed between the two months.

## Quadratic Equations

Zarig took part in a 26 mile road race.

- He ran the first 15 miles at an average speed of  $x$  mph. He ran the last 11 miles at an average speed of  $(x-2)$  mph. Write down an expression, in terms of  $x$ , for the time he took to complete the 26 mile race
- Zarig took 4 hours to complete the race. Using your answer to part a), form an equation in terms of  $x$
- Simplify your equation and show that it can be written as  $2x^2-17x+15=0$
  - Solve this equation and obtain Zarig's average speed over the first 15 miles of this race

## Scale Drawings and Trigonometry

A car travels from its base on a bearing of  $030^\circ$  for 12 km. It then turns and drives a further 8 km on a bearing of  $100^\circ$  after which it breaks down.

- Draw a clear sketch of this journey, stating all the known lengths and angles
- A recovery vehicle leaves base to pick up the car. How far must it travel and on what bearing should it head?

## Probability

Matthew is an A-level student studying English, History and French.

He plans to go to University and has received a conditional offer from the University of Central Lancashire of 'B C C' in any combination of subjects

Matthew's homework grades								
English	B	C	C	C	D	C	D	B
History	B	C	C	B	C	D	C	B
French	C	D	C	B	C	B	C	C

- What are the chances that Matthew **exactly** meets the offer from the University of Central Lancashire?
- What are the chances that Matthew meets or exceeds the University of Central Lancashire's offer?
- How would it affect your conclusions if your assumptions are wrong?

**Authenticity Cover Sheet**

**Authenticity Cover Sheet**

**Name of learner**

**Qualification title:**

1. I confirm that all the work submitted in this assignment is my own
2. I confirm that I used the Harvard referencing system to acknowledge all quotes and all references to research and wider reading

Learner signature:

Date:

Assessor's name and signature

Date:

Internal Verifier's name and signature

Date: