Entry 3, Level 1 and 2 Certificate in the Principles of Using Mathematical Techniques (3844-12/20/22)

September 2017 Version 2.2

City&Guilds

Qualification at a glance

Subject area	Foundations for learning and life
City & Guilds number	3844-12/20/22
Age group approved	16+
Entry requirements	n/a
Assessment	e-volve test
Fast track	Available (see page 6 for details)
Support materials	See page 8 for details
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

Title and level	GLH	TQT	City & Guilds number	Accreditation number
Entry Level Certificate in the Principles of Using Mathematical Techniques (Entry 3)	130	130	3844-20	601/1288/8
Level 1 Certificate in the Principles of Using Mathematical Techniques	98	130	3844-12	600/7655/0
Level 2 Certificate in the Principles of Using Mathematical Techniques	98	130	3844-22	600/7656/2

Version and date	Change detail	Section
2.1 December 2013	Amended assessment information re paper-based tests	Assessment
2.2 September 2017	Added TQT and GLH details	Qualification at a Glance, Structure
	Deleted QCF	Appendix

Contents

1   Introduction

This document tells you what you need to do to deliver the qualifications:

Area	Description
Who are the qualifications for?	The main purpose of these qualifications is for candidates who need to develop mathematical skills at a level necessary to function and progress in life, work or in society in general. For many this will also support progression towards a GCSE Mathematics or Level 2 Functional Mathematics learning programme.
Are the qualifications part of a framework or initiative?	Not specifically, although the qualifications may provide a useful addition to Foundation Learning programmes.
Who did we develop the qualification with?	The qualifications have been developed in association with a wide range of providers and employers
What opportunities for progression are there?	The qualifications allow learners to progress: • from Entry 3 to Level 1 to Level 2 within this suite • to 3847 Mathematics Skills qualifications • a City & Guilds vocational qualification • an Apprenticeship programme • to employment • towards a GCSE in Mathematics • towards a Level 2 Functional Skills qualification in Mathematics.

Qualification rationale

In response to the Skills Funding Agency's statement of February 2012, City & Guilds has developed a suite of qualifications to support learners to progress towards a learning programme in GCSE Mathematics or level 2 Functional Mathematics.

In line with the Skills Funding Agency statement, these qualifications focus on the core mathematics skills required to enable this progression, with a particular focus on the knowledge, understanding, accuracy and resilience required to make progress. These qualifications are suitable for learners who need to demonstrate skills and knowledge at a given level for access to employment, further learning or another specific reason. The learning outcomes and assessment criteria are based upon

the national Adult Numeracy standards and mapped to the Adult Numeracy Core Curriculum. The assessments do not cover 100% of the Adult Numeracy standards, but address specific key areas, many of which are highlighted by employers (through individual consultation and in national research - CBI Education and Skills Survey, May 2011) as lacking in many prospective employees e.g. solid number skills, mental arithmetic, measures and conversions.

The qualifications do not explicitly seek to assess problem solving capability, although some questions will be scenario-based, allowing those who aim to progress to a Functional Skills learning programme to build a solid foundation for the technical skills, as well as confidence to work under timed conditions.

The qualifications in this suite provide robust assessment of selected skills gained. They are offered as single, objective, summative assessment tests which are externally set and externally marked and taken under timed conditions. They provide a level of flexibility for learners who require an assessment opportunity 'when ready' and may suit those learners for whom a portfolio approach is not suitable.

Structure

To achieve the **Entry Level Certificate in the Principles of Using Mathematical Techniques (Entry 3)**, learners must achieve **13** credits from the mandatory unit.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Mandatory			
K/505/2399	Unit 002	Principles of using mathematical techniques	13

To achieve the **Level 1 Certificate in the Principles of Using Mathematical Techniques**, learners must achieve 13 credits from the mandatory unit.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Mandatory			

F/504/5524	Unit 102	Principles of using mathematical techniques	13

To achieve the **Level 2 Certificate in the Principles of Using Mathematical Techniques**, learners must achieve **13** credits from the mandatory unit.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value
Mandatory			
J/504/5525	Unit 202	Principles of using mathematical techniques	13

Total Qualification Time

Total Qualification Time (TQT) is the total amount of time, in hours, expected to be spent by a Learner to achieve a qualification. It includes both guided learning hours (which are listed separately) and hours spent in preparation, study and assessment.

Title and level	GLH	TQT
Entry Level Certificate in the Principles of Using Mathematical Techniques (Entry 3)	130	130
Level 1 Certificate in the Principles of Using Mathematical Techniques	98	130
Level 2 Certificate in the Principles of Using Mathematical Techniques	98	130

Centre requirements

Approval

If your Centre is approved to offer the following qualifications:

- Functional Skills Mathematics (3748)
- Adult Numeracy (3792)

you can apply for approval for the new Certificates in the Principles of Using Mathematical Techniques (3844-12/20/22) using the **fast track approval form**, available from the City & Guilds website.

Centres should use the fast track form if:

- there have been no changes to the way the qualifications are delivered, and
- they meet all of the approval criteria in the fast track form guidance notes.

Fast track approval is available for 12 months from the launch of the qualification. After 12 months, the Centre will have to go through the standard Qualification Approval Process. The centre is responsible for checking that fast track approval is still current at the time of application.

To offer these qualifications, new centres will need to gain both centre and qualification approval. Please refer to the *Centre Manual - Supporting Customer Excellence* for further information.

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualifications before designing a course programme.

Resource requirements

Human resources

To meet the quality assurance criteria for these qualifications, the centre must ensure that the following internal roles are undertaken:

- Quality Assurance Co-ordinator
- Trainer/Tutor

These roles are defined more fully in the document 'Qualification and Systems Consultant Roles'.

Further supporting quality assurance documents can be found here:
http://www.cityandguilds.com/Provide-Training/Centre-Support/Centre-Document-Library/Policies-and-Procedures/Quality-Assurance-Documents

Centre Staffing

Staff delivering these qualifications must be:

- competent in the Mathematics being taught and assessed
- fully conversant with the National Standards for Adult Numeracy and the subject criteria for Functional Skills Mathematics

Teaching qualifications and subject specialist qualifications

It is good practice for staff to hold or be working towards a recognised teacher training qualification and/or relevant subject-specific teaching qualification, and depending on delivery setting/location this might be necessary to obtain public funding.

Continuing professional development (CPD)

Centres are expected to support their staff in ensuring that their knowledge of the skills standards, delivery and assessment requirements, remains current.

Candidate entry requirements

City & Guilds does not set entry requirements for these qualifications. However, centres must ensure that candidates have the potential and opportunity to gain the qualifications successfully.

Age restrictions

City & Guilds cannot accept any registrations for candidates under 16 as these qualifications are not approved for under 16s.

2 Delivering the qualification

Initial assessment and induction

An initial assessment of each candidate should be made before the start of their programme to identify:

- if the candidate has any specific training needs
- support and guidance they may need when working towards their qualifications
- any units they have already completed, or credit they have accumulated which is relevant to the qualifications.
- the appropriate type and level of qualification.

We recommend that centres provide an induction programme so the candidate fully understands the requirements of the qualifications, their responsibilities as a candidate, and the responsibilities of the centre. This information can be recorded on a learning contract.

Support materials
The following resources are available for these qualifications:

Description	How to access
Sample test papers	Walled garden
fast track approval forms/generic approval form	www.cityandguilds.com
Promotional materials	www.cityandguilds.com

For further information to assist with the planning and development of the programme, please refer to the following:

- Adult Numeracy core curriculum
  http://www.excellencegateway.org.uk/node/1514
- Numeracy Progression overview
  http://www.excellencegateway.org.uk/node/14938

3   Assessment

City & Guilds has written the following assessments to use with this qualification:

- On screen tests, using e-volve

For the Entry Level Certificate in the Principles of Using Mathematical Techniques learners must achieve tests 002 (test A without a calculator) **and** 003 (test B with a calculator).

For the Level 1 Certificate in the Principles of Using Mathematical Techniques, learners must achieve tests 102 (test A without a calculator) **and** 103 (test B with a calculator).

For the Level 2 Certificate in the Principles of Using Mathematical Techniques, learners must achieve tests 202 (test A without a calculator) **and** 203 (test B with a calculator).

Unit	Title	Assessment method	Where to obtain assessment materials
002	Principles of using mathematical techniques – test 1 (002 – without a calculator)	On screen tests using e-volve	Examinations provided on e-volve
003	Principles of using mathematical techniques – test 2 (003 – with a calculator)	On screen tests using e-volve	Examinations provided on e-volve.
102	Principles of using mathematical techniques – test 1 (102 – without a calculator)	On screen tests using e-volve	Examinations provided on e-volve
103	Principles of using mathematical techniques – test 2 (103 – with a calculator)	On screen tests using e-volve	Examinations provided on e-volve.
202	Principles of using mathematical techniques – test 1 (202 – without a calculator)	On screen tests using e-volve	Examinations provided on e-volve.

Unit	Title	Assessment method	Where to obtain assessment materials
203	Principles of using mathematical techniques – test 2 (203- with a calculator)	On screen tests using e-volve	Examinations provided on e-volve.

Test specifications

The way the knowledge is covered by each test is laid out in the tables below:

Test 1:   002 – without a calculator
Duration: 1 hour
Pass mark: 70%

Unit	Outcome	Number of questions	%
102	1 Be able to use numbers in problem solving	15-19	60-76
	2 Be able to use common measures in problem solving	6-10	24-40
	Total		100

Test 2:   003 – with a calculator
Duration: 1 hour
Pass mark: 70%

Unit	Outcome	Number of questions	%
102	1 Be able to use numbers in problem solving	10-14	40-56
	2 Be able to use common measures in problem solving	5-7	20-28
	3 Be able to use data and statistical measure in problem solving	4-5	16-20
	Total		100

Test 1:   102 – without a calculator
Duration: 1 hour
Pass mark: 70%

Unit	Outcome	Number of questions	%
102	1 Be able to use numbers in problem solving	19 - 23	63 - 77
	2 Be able to use common measures in problem solving	7 - 11	23 - 37
	Total	30	100

Test 2:   103 – with a calculator
Duration: 1 hour
Pass mark: 70%

Unit	Outcome	Number of questions	%
102	1 Be able to use numbers in problem solving	12 - 16	40 - 53
	2 Be able to use common measures in problem solving	5 - 7	17 - 23
	3 Be able to use data and statistical measure in problem solving	8 - 12	27 - 40
	Total	30	100

Test 1:   202 – without a calculator
Duration: 1 hour
Pass mark: 70%

Unit	Outcome	Number of questions	%
202	1 Be able to use numbers of any value in problem solving	16 – 20	53 - 67
	2 Be able to use common measures in different systems in problem solving	10 -14	33 - 47
	Total	30	100

Test 2:   203 – with a calculator
Duration: 1 hour
Pass mark: 70%

Unit	Outcome	Number of questions	%
202	1 Be able to use numbers of any value in problem solving	13 -17	43 - 57
	2 Be able to use common measures in	4 - 6	13 -

different systems in problem solving			20
3 Be able to use continuous and discrete data and statistical measure in problem solving		9 -13	30 - 43
	Total	30	100

Recognition of prior learning (RPL)

Recognition of prior learning means using a person's previous experience or qualifications which have already been achieved to contribute to a new qualification.

RPL is not allowed for this qualification.

Maths Tutor Guidance

Sitting the test

Candidates will be required to sit two tests – one test that will allow the use of a calculator, and one test where a calculator may not be used. Candidates may have access to the following other materials during the assessment:

- rough paper, pens and pencils
- dictionaries or spell-checks

Each test is 1 hour in length. Candidates are not required to complete both calculator and non-calculator tests at the same time, however centres may wish to complete both tests in the same sitting.

Sample tests

Online sample assessments will be available to schedule via the Walled Garden, **www.walledgarden.com**. The qualification numbers to access the sample tests are 3844-402 and 3844-403 for Sample Entry 3, 3844-502 and 3844-503 for Sample Level 1 and 3844-602 and 3844-603 for Sample Level 2.

Candidates should attempt **at least one** sample paper prior to taking their live test. The tests scheduled via walled garden will provide immediate feedback. Samples sat via our website will not be marked and are more for familiarisation with the layout of the questions.

Navigation tutorial screens

At the start of every test candidates are presented with a brief tutorial on how to use each of the different item types. Please make sure the candidate reads through these screens before they press the 'start exam' button.

3.2   Access Arrangements

Guidance on applying for access arrangements for on-screen Examinations

Access arrangements for on-line examinations

City & Guilds **Access to assessment and qualifications**
document can be downloaded from our website
www.cityandguilds.com/policy.

For access arrangements which require City & Guilds authorisation
i.e. readers, scribes, over 25% extra time, centres must make an
application to City & Guilds one month before the month of the
examination, e.g. by 31 October for December examinations. Please
refer to chapter 2 in the booklet 'Access to assessment and
qualifications' for guidance.

Additional time

Centres can usually schedule time extensions for candidates needing
up to 25% extra time. A guide on how to do this can be found at
www.cityandguilds.com/e-volve

Time can be added in percentage multipliers of the test time, in
increments of five e.g. 5%, 10% up to 25%.

Requests for over 25% extra time will need to be made to Policy &
Regulation City & Guilds. Approval can be applied for and given for
all online Principles of Using Mathematical Techniques exams, for
the entire year.

Rest Breaks

The candidate must, as usual, be supervised during any short rest
breaks and the system must be invigilated also to ensure that no one
else can access the candidate's test or accidentally close the test
down. When a break is needed the on screen e-assessments may be
paused. The use of the pause function through the SecureAssess
portal will lock the assessment as well as stop the clock. This function
should also be used in the event of an emergency.

Documentation for access arrangements

Evidence in support of an access arrangement must be held on file at
your centre. Please see chapter 4 in the booklet 'Access to assessment
and qualifications' for the evidence required for applications for a
candidate with learning difficulties.

Use of an assistant

The e-volve software allows candidates to use a keyboard or mouse
and does not support other means. If the keyboard or mouse is not a
standard one we recommend that the student is given access to the e-
volve Navigation test well in advance of the proposed examination
date using the special keyboard or mouse. Should any difficulties be
experienced with the equipment we would be happy to consider the
use of an assistant.

Use of Other Software

At present, the use of other accessibility software with the on screen examinations is not supported. City & Guilds are liaising with software providers to develop accessibility to extend wider provision for all disabilities, this includes screen magnification software. Learners have the ability to change the text colour and background once they have entered their keycode. This leaves the learner time to find the best combination for their particular need.

Alternatively, there may be other non software application options such as placing a coloured overlay on the PC screen which may be trialled.

Contact details

Access Arrangements
City & Guilds
1 Giltspur Street
London EC1A 9DD

Telephone: 020 7294 2772
Fax: 020 7294 2416
e-mail: policy@cityandguilds.com

4 Units

Structure of units

These units each have the following:
- City & Guilds reference number
- unit accreditation number (UAN)
- title
- level
- credit value
- guided learning hours
- unit aim
- relationship to other standards
- learning outcomes which are comprised of a number of assessment criteria.

Unit 002   Principles of using mathematical techniques

UAN:	K/505/2399
Level:	Entry 3
Credit value:	13
GLH:	130
Relationship to other standards:	This unit is linked to the National Standards for Adult Numeracy and the Adult Numeracy Core Curriculum
Aim:	This unit has been devised to assess the candidates' knowledge on a range of techniques that are used in mathematical problems. This unit covers the use of number up to 1000, the use of common measures and instruments and the use of data.

Learning outcome
The learner will: 1. be able to use numbers in problem solving.
Assessment criteria
The learner can: 1.1   use **the four rules** in **whole number calculations** with and without a calculator (N1/E3.1-N1/E3.6, N1/E3.9, N2/E3.4) 1.2   **estimate answers** to calculations (N1/E3.7-N1/E3.8, N2/L1.11) 1.3   recognise **common fractions** (N2/E3.1-N2/E3.2, N2/L1.11) 1.4   use **decimals** up to two places. (N2/E3.3)

Range
The four rules • add • subtract • multiply • divide

Range continued

Whole number calculations
- whole numbers up to 1000
- understand place value including zero as a place holder
- count on or back in 10s and 100s
- add and subtract three digit whole numbers
- read, write, order and compare numbers
- recognise odd and even numbers
- recall addition, subtraction and multiplication facts
- with and without a calculator

Estimate answers
- use rounding to estimate answers

Common fractions
- half, thirds, quarters, fifths, tenths
- recognise equivalent forms

Decimals
- read, write, and understand up to two places with and without a calculator
- use the four rules up to two places.

Learning outcome
The learner will:
2. be able to use common measures in problem solving.
Assessment criteria
The learner can:
2.1 use addition and subtraction for calculating **money** (MSS1/E3.1)
2.2 **estimate** answers to money calculations (MSS1/E3.2)
2.3 record **measures** using **non-standard units** and **standard units** (MSS1/E3.2 – MSS1/E3.7, MSS1/E3.9)
2.4 use **measuring instruments** (MSS1/E3.8 – MSS1/E3.9)
2.5 **solve practical problems** using mathematical properties of 2-D and 3-D shapes. (MSS2/E3.1)

Range

Money
    • using decimal notation
    • aligning decimal points and figures in columns
Estimate
    • to the nearest 10p and pound (£)
Measures
    • time in common date formats and am and pm
    • length, including distance
    • weight
    • capacity
    • temperature
Non-standard units
    • imperial
Standard units
    • metric
Measuring instruments
    • suitable for length, weight, capacity and temperature
Solve practical problems
    • using symmetry
    • using right angles
    • using side length

Learning outcome
The learner will: 3. be able to use data in everyday situations.
Assessment criteria

The learner can:
3.1   extract information from **different sources**
      (HD1/E3.1)
3.2   **make comparisons** from bar chart and pictograms
      (HD1/E3.2)
3.3   use a tally to **record** information
      (HD1/E3.3)
3.4   **represent** information in **different ways.**
      (HD1/E3.4)

Range

Different sources
   • lists
   • tables
   • diagrams
   • bar charts
   • pictograms
Make comparisons
   • using height or length of bars
   • number of pictures or icons
Record
   • using a five bar gate tally
Represent
   • using a title, axis and simple scale in a bar chart
   • using a key for a pictogram
   • labelling diagrams
Different ways
   • tables, charts and diagrams

Unit 102   Principles of using mathematical techniques

UAN:	F/504/5524
Level:	1
Credit value:	13
GLH:	98
Relationship to other standards:	This unit is linked to the National Standards for Adult Numeracy and the Adult Numeracy Core Curriculum
Aim:	This unit has been devised to assess the candidates' knowledge on a range of techniques that are used in mathematical problem s. This unit covers the use of numbers, the use of common measures, and the use of data and statistical measure.

Learning outcome
The learner will:
1. Be able to use numbers in problem solving
Assessment criteria

The learner can:
 1.1   use **the four rules** in **whole number calculations** with and without a calculator
       (N1/L1.1-N1/L1.7, N2/L1.11)
 1.2   **estimate answers** to calculations
       (N1/L1.8-N1/L1.9, N2/L1.11)
 1.3   **find parts** of whole number quantities and measurements with and without a calculator
       (N2/L1.1-N2/L1.3, N2/L1.11)
 1.4   use **the four rules** in **decimal calculations** with and without a calculator
       (N2/L1.3-N1/L1.7, N2/L1.11)
 1.5   use **the four rules** in **percentage calculations** with and without a calculator
       (N2/L1.3, N2/L1.8-N2/L1.11)

Range
The four rules • add • subtract • multiply • divide **Whole number calculations** • whole numbers up to seven digits, including the use of zero as a place holder • recognise numerical relationships • simple ratio expressed in words • direct proportion in two parts • read, write, order and compare numbers without a calculator • recognise negative numbers • recall multiplication facts **Estimate answers** • use rounding to estimate answers • estimate to check answers are reasonable • with or without a calculator **Find parts** • common fractions (halves, thirds, quarters, fifths, tenths) and mixed numbers • read, write, order and compare fractions and mixed numbers • recognise equivalencies between fractions, percentages and decimals **Decimal calculations** • read, write, order and compare up to three places without a calculator • use the four rules up to two places • rounding decimals up to three places to a whole number or two decimal places **Percentage calculations** • read, write, order and compare whole number percentages • find whole number percentage parts of quantities and measurements

Learning outcome
The learner will:
2. be able to use common measures in problem solving
Assessment criteria
The learner can: 2.1   use **the four rules** for calculating **measures** within the same system with and without a calculator (MSS/L1.1-MSS/L1.7) 2.2   use dimensions to **measure** regular shapes without a calculator (MSS/L1.8-MSS/L1.10) 2.3   **solve problems** using mathematical properties of 2D shapes (MSS2/L1.1-MSS2/L1.2) 2.4   use units of measure to **define quantities**

(MSS/L1.1-MSS/L1.10)

Range
The four rules   •   add   •   subtract   •   multiply   •   divide   **Measures**   •   money expressed in pounds in pence   •   time in common date formats and 12 hour and 24 hour clock   •   length, including distance   •   weight   •   capacity   •   temperature   •   convert units of measure within the same system   **Measure**   •   work out perimeter   •   work out area of rectangles   •   work out volume   **Solve problems**   •   tessellation   •   symmetry   •   draw 2D shapes in different orientations using grids   **Define quantities**   •   money   •   time   •   length   •   weight   •   capacity   •   temperature

Learning outcome
The learner will: 3.   be able to use data and statistical measure in problem solving

Assessment criteria

The learner can:
 3.1   interpret information from **different sources**
      (HD1/L1.1-HD1/L1.2)
 3.2   find the mean for sets of data
      (HD1/L1.3)
 3.3   find the range for sets of data
      (HD1/L1.4)
 3.4   express the likelihood of independent events using a **probability scale**
      (HD2/L1.1-HD2/L1.2)
 3.5   represent discrete data in **different forms**
      (HD1/L1.2)

Range

Different sources
    •   tables
    •   charts
    •   diagrams
    •   line graphs
Probability scale
    •   using fractions
    •   using decimals
    •   using percentages
Different forms
    •   tables
    •   charts
    •   diagrams

Unit 202 Principles of using mathematical techniques

UAN:	J/504/5525
Level:	2
Credit value:	13
GLH:	98
Relationship to other standards:	This unit is linked to the National Standards for Adult Numeracy and the Adult Numeracy Core Curriculum
Aim:	This unit has been devised to assess the candidates' knowledge on a range of techniques that are used in mathematical problem s. This unit covers the use of numbers of any value, the use of common measures in different systems, and the use of continuous and discrete data and statistical measure.

Learning outcome
The learner will:
1. Be able to use numbers of any value in problem solving
Assessment criteria
The learner can: 1.1 use the four rules in whole number calculations using calculator and non-calculator methods (N1/L2.1-N1/L2.4, N2/L2.10)   1.2 calculate parts of whole number amounts and quantities using calculator and non-calculator methods (N2/L2.1.1-N2/L2.4, N2/L2.10)   1.3 use the four rules in decimal calculations using calculator and non-calculator methods (N2/L2.5-N1/L2.6, N2/L2.10)   1.4 use the four rules in percentage calculations using calculator and non-calculator methods (N2/L2.7, N2/L2.9- N2/L2.10)

Range
The four rules • add • subtract • multiply • divide **Whole number calculations** • positive and negative whole numbers of any value • ratio expressed in the form a:b:c • direct proportion to any factor • evaluate expressions and make substitutions in given formulae • read, write, order and compare whole numbers of any value without calculator **Calculate parts** • fractions and mixed numbers • order and compare fractions and mixed numbers of amounts and quantities • add and subtract amounts and quantities • use equivalencies between fractions, percentages and decimals • evaluate one number as a fraction of another **Decimal calculations** • up to three places • order, approximate and compare decimals when solving problems without a calculator **Percentage calculations** • order and compare percentages of any value • calculate percentage parts of quantities and measurements • evaluate one number as a percentage of another • calculate results of percentage increases and decreases

Learning outcome
The learner will: 2. be able to use common measures in different systems in problem solving

Assessment criteria
The learner can: 2.1 use **the four rules** for calculating **measures** between different systems with and without a calculator (MSS1/L2.1-MSS1/L2.6) 2.2 calculate perimeters, areas and volumes of **shapes** from formulae (MSS1/L2.7-MSS1/L2.9) 2.3 **solve problems** using 2D shapes with and without a calculator (MSS1/L2.1-MSS1/L2.2) 2.4 work out dimensions from scale drawings (MSS1/L2.10) 2.5 select units of measure to **define quantities** (MSS1/L2.1-MSS1/L2.10)

Range
The four rules
- add   - subtract   - multiply   - divide   **Measures**   - money in different currencies   - time in different formats   - length, including distance, in imperial and metric units   - weight in imperial and metric units   - capacity in imperial and metric units   - temperature in Celsius and Fahrenheit   - convert units of measure between systems using scales, tables and conversion factor   **Shapes**   - perimeters and areas of regular shapes   - areas of composite shapes   - volumes of regular shapes   **Solve problems**   - recognise and use common 2D representation of 3D objects   - involving 2D shapes and parallel lines   **Define quantities**   - money   - time   - length   - weight   - capacity   - temperature

Learning outcome
The learner will:
3. be able to use continuous and discrete data and statistical measure in problem solving

Assessment criteria
The learner can:
3.1 interpret discrete and continuous data from **different sources** (HD1/L2.1)
3.2 use **averages** for comparison of sets of data (HD1/L2.3)
3.3 describe the spread between sets of data (HD1/L2.4)
3.4 express the likelihood of **combined events in diffferent forms** (HD2/L2.1)
3.5 represent **discrete and continuous data in different forms** (HD1/L2.2)

Range
Different sources

- complex tables
- composite charts
- scale diagrams
- line graphs with more than one line

Averages
- mean
- mode
- media

Combined events in different forms
- tables
- tree diagrams

Discrete and continuous data in different forms
- complex tables
- composite charts
- scale diagrams
- line graphs with more than one line

Appendix 1   Relationships to other qualifications

Links to other qualifications

The standards for GCSE mathematics and Functional skills mathematics have been provided as guidance and suggest areas of commonality between the qualifications. It does not imply that candidates completing units in one qualification have automatically covered all of the content of another.

Centres are responsible for checking the different requirements of all qualifications they are delivering and ensuring that candidates meet requirements of all units/qualifications.

These qualifications have connections to the:
* Level 1 Mathematics Skills (3847)
* Level 2 Mathematics Skills (3847)

Literacy, language, numeracy and ICT skills development

These qualifications can develop skills that can be used in the following qualifications:
* Functional Skills (England) – see www.cityandguilds.com/functionalskills
* Essential Skills (Northern Ireland) – see www.cityandguilds.com/essentialskillsni
* Essential Skills Wales – see **www.cityandguilds.com/esw**

Mathematics at L1

GCSE Mathematics			Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes		Skills	Skill standards	Coverage and range	Outcomes

AO1	Recall and use their knowledge of the prescribed content.	**Number and algebra**
		
		• add, subtract, multiply and divide any number;
		• order rational numbers;
		• use the concepts and vocabulary of factor (divisor), multiple, common factor, highest common factor, least common multiple, prime number and prime factor decomposition;
		• use the terms square, positive and negative square root, cube and cube root;
		• use index notation for squares, cubes and powers of ten;
		• use index laws for multiplication and division of integer
		• understand equivalent fractions, simplifying a fraction by cancelling all common factors;
		• add and subtract fractions;
		• use decimal notation and recognise that each terminating decimal is a fraction;
		• recognise that recurring decimals are exact fractions, and that some exact fractions are recurring decimals;
		• understand that 'percentage' means 'number of parts per 100' and use this to compare proportions;
		• use percentages
		• interpret fractions, decimals and percentages as operators;
		• use ratio notation, including reduction to
			Representing
			1. Understand practical problems in familiar and unfamiliar contexts and situations, some of which are non-routine.
			2. Identify and obtain necessary information to tackle the problem.
			3. Select mathematics in an organised way to find **solutions.**
				a) Understand and use whole numbers and understand negative numbers in practical contexts;
				
				b) Add, subtract, multiply and divide whole numbers using a range of strategies;
				
				c) Understand and use equivalences between common fractions, decimals and percentages;
				
				d) Add and subtract decimals up to two decimal places;
				
				e) Solve simple problems involving ratio, where one number is a multiple of the other;
				
				f) Use simple formulae expressed in words for one- or two-step operations;
				
				g) Solve problems requiring calculation with common measures, including money, time, length, weight, capacity and temperature;
					Level 1
					
					Be able to use numbers in problem solving
					    The four rules
					    add
					    subtract
					    multiply
					    divide
					
					    Whole number calculations
					    whole numbers up to seven digits, including the use of zero as a place holder
					    recognise numerical relationships
					    simple ratio expressed in words
					    direct proportion in two parts
					    read, write order and compare numbers without a calculator
					    recognise negative numbers
					    recall multiplication facts
					
					    Estimate answers
					    use rounding to estimate answers
					    estimate to check answers are reasonable
					    with or without a calculator
					
					    Find parts

GCSE Mathematics		Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes	Skills	Skill standards	Coverage and range	Outcomes
	its simplest form and its various links to fraction notation; • understand and use number operations and the relationships between them, including inverse operations and hierarchy of operations; • divide a quantity in a given ratio; • approximate to specified or appropriate degrees of accuracy including a given power of ten, number of decimal places and significant figures; • use calculators effectively and efficiently, including statistical; • distinguish the different roles played by letter symbols in algebra, using the correct notation; • distinguish in meaning between the words equation, formula and expression; • manipulate algebraic expressions by collecting like terms, by multiplying a single term over a bracket, and by taking out common factors; • set up and solve simple equations; • derive a formula, substitute numbers into a formula and change the subject of a formula; • solve linear inequalities in one variable, and represent the solution set on a number line; • use systematic trial and improvement to find approximate solutions of equations where there is no simple analytical method of solving them; • generate terms of a sequence using term-		h) Convert units of measure in the same system; i) Work out areas and perimeters in practical situations; j) Construct geometric diagrams, models and shapes; k) Extract and interpret information from tables, diagrams, charts and graphs; l) Collect and record discrete data and organise and represent information in different ways;	common fractions (halves, thirds, quarters, fifths, tenths) and mixed numbers read, write, order and compare fractions and mixed numbers recognise equivalencies between fractions, percentages and decimals **Decimal calculations** read, write, order and compare up to three places without a calculator use the four rules up to two places rounding decimals up to three places to a whole number or two decimal places **Percentage calculations** read, write, order and compare whole number percentages find whole number percentage parts of quantities and measurements **be able to use common measures in problem solving** **The four rules** add subtract multiply divide

GCSE Mathematics		Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes	Skills	Skill standards	Coverage and range	Outcomes
	to-term and position-to-term definitions of the sequence; • use linear expressions to describe the nth term of an arithmetic sequence; • use the conventions for coordinates in the plane and plot points in all four quadrants, including using geometric information; • recognise and plot equations that correspond to straight-line graphs in the coordinate plane, including finding gradients; • construct linear functions from real-life problems and plot their corresponding graphs; • discuss, plot and interpret graphs (which may be non-linear) modelling real situations; • generate points and plot graphs of simple quadratic functions, and use these to find approximate solutions. **Geometry and measures** • recall and use properties of angles at a point, angles at a point on a straight line (including right angles), perpendicular lines and opposite angles at a vertex; • understand and use the angle properties of parallel and intersecting lines, triangles and quadrilaterals; • calculate and use the sums of the interior and exterior angles of polygons; • recall the properties and definitions of			**measures** money expressed in pounds in pence time in common date formats and 12 hour and 24 hour clock length, including distance weight capacity temperature convert units of measure within the same system **Measure** work out perimeter work out area of rectangles work out volume **Solve problems** tessellation symmetry draw 2D shapes in different orientations using grids **Define quantities** money time length weight capacity temperature be able to use data and statistical measure in problem

GCSE Mathematics		Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes	Skills	Skill standards	Coverage and range	Outcomes
	special types of quadrilateral, including square, rectangle, parallelogram, trapezium, kite and rhombus; • recognise reflection and rotation symmetry of 2D shapes; • understand congruence and similarity; • use Pythagoras' theorem in 2D and 3D; • distinguish between centre, radius, chord, diameter, circumference, tangent, arc, sector and segment; • use 2D representations of 3D shapes; • describe and transform 2D shapes using single or combined rotations, reflections, translations, or enlargements by a positive scale factor and distinguish properties that are preserved under particular transformations; • use and interpret maps and scale drawings; • understand the effect of enlargement for perimeter, area and volume of shapes and solids; • interpret scales on a range of measuring instruments and recognise the inaccuracy of measurements; • convert measurements from one unit to another; • make sensible estimates of a range of measures; • understand and use bearings; • understand and use compound measures; • measure and draw lines and angles;			solving **Different sources** tables charts diagrams line graphs **Probability scale** using fractions using decimals using percentages **Different forms** tables charts diagrams

GCSE Mathematics		Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes	Skills	Skill standards	Coverage and range	Outcomes
	• draw triangles and other 2D shapes using a ruler and protractor; • use straight edge and a pair of compasses to do constructions; • construct loci; • calculate perimeters and areas of shapes made from triangles and rectangles; • find circumferences and areas of circles; • calculate volumes of right prisms and of shapes made from cubes and cuboids; **Statistics and probability** • understand and use statistical problem solving process/handling data cycle; • identify possible sources of bias; • design an experiment or survey; • design data-collection sheets, distinguishing between different types of data; • extract data from printed tables and lists; • design and use two-way tables for discrete and grouped data; • produce charts and diagrams for various data types; • calculate median, mean, range, mode and modal class; • interpret a wide range of graphs and diagrams and draw conclusions; • look at data to find patterns and exceptions; • recognise correlation and draw and/or use lines of best fit by eye, understanding what these represent;			

GCSE Mathematics		Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes	Skills	Skill standards	Coverage and range	Outcomes
	• compare distributions and make inferences; • compare distributions and make inferences; • understand and use the vocabulary of probability and the probability scale; • understand and use estimates or measures of probability from theoretical models (including equally likely outcomes), or from relative frequency; • list all outcomes for single events, and for two successive events, in a systematic way and derive related probabilities; • identify different mutually exclusive outcomes and know that the sum of the probabilities of all these outcomes is 1; • compare experimental data and theoretical probabilities; • understand that if they repeat an experiment, they may – and usually will – get different outcomes, and that increasing sample size generally leads to better estimates of probability and population characteristics.			

Mathematics at L2

GCSE Mathematics			Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes		Skills	Skill standards	Coverage and range	Outcomes
AO1	Recall and use their knowledge of the prescribed content.	**Number and algebra** • add, subtract, multiply and divide any number; • order rational numbers; • use the concepts and vocabulary of factor (divisor), multiple, common factor, highest common factor, least common multiple, prime number and prime factor decomposition; • use the terms square, positive and negative square root, cube and cube root; • use index notation for squares, cubes and powers of ten; • use index laws for multiplication and division of integer, fractional and negative powers; • interpret, order and calculate with numbers written in standard index form; • understand equivalent fractions, simplifying a fraction by cancelling all common factors; • add and subtract fractions; • use decimal notation and recognise that each terminating decimal is a fraction; • recognise that recurring decimals are exact fractions, and that some exact fractions are recurring decimals; • understand that 'percentage' means 'number of parts per 100' and use this to compare proportions; • use percentage, repeated proportional change; • understand and use direct and indirect proportion; • interpret fractions, decimals and percentages as operators; • use ratio notation, including reduction to its simplest form and its various links to fraction	**Representing** 1. Understand routine and non-routine problems in familiar and unfamiliar contexts and situations. 2. Identify the situation or problems and identify the mathematical methods needed to solve them. 3. Choose from a range of mathematics to find solutions.	a) Understand and use positive and negative numbers of any size in practical contexts; b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places; c) Understand, use and calculate ratio and proportion, including problems involving scale; d) Understand and use equivalences between fractions, decimals and percentages; e) Understand and use simple formulae and equations involving one- or two-step operations; f) Recognise and use 2D representations of 3D objects; g) Find area, perimeter and volume of common shapes; h) Use, convert and calculate using metric and, where appropriate, imperial measures; i) Collect and represent discrete	**Level 2 units** **Be able to use numbers of any value in problem solving** The four rules add subtract multiply divide **Whole number calculations** positive and negative whole numbers of any value ratio expressed in the form a:b:c direct proportion to any factor evaluate expressions and make substitutions in given formulae read, write, order and compare whole numbers f any value without a calculator **Calculate parts** fractions and mixed numbers order and compare fractions and mixed numbers of amounts and quantities add and subtract amounts and quantities use equivalencies between fractions, percentages and decimals evaluate one number as a fraction of another **Decimal calculations** up to three places order, approximate and compare decimals when solving problems without a calculator **Percentage calculations** order and compare percentages of any

GCSE Mathematics		Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes	Skills	Skill standards	Coverage and range	Outcomes

GCSE Mathematics Skills	Functional Skills Coverage and range	Principles of Using Mathematical Techniques Outcomes
notation; • understand and use number operations and the relationships between them, including inverse operations and hierarchy of operations; • use surds and π in exact calculations; • calculate upper and lower bounds; • divide a quantity in a given ratio; • approximate to specified or appropriate degrees of accuracy including a given power of ten, number of decimal places and significant figures; • use calculators effectively and efficiently, including statistical and trigonometrical functions; • distinguish the different roles played by letter symbols in algebra, using the correct notation; • distinguish in meaning between the words equation, formula, identity and expression; • manipulate algebraic expressions by collecting like terms, by multiplying a single term over a bracket, and by taking out common factors, multiplying two linear expressions, factorising quadratic expressions including the difference of two squares, and simplifying rational expressions; • set up and solve simple equations including simultaneous equations in two unknowns; • solve quadratic equations; • derive a formula, substitute numbers into a formula and change the subject of a formula; • solve linear inequalities in one or two variables, and represent the solution set on a number line or suitable diagram; • use systematic trial and improvement to find approximate solutions of equations where there is no simple analytical method of solving them; • generate terms of a sequence using term-to-term	and continuous data, using ICT where appropriate; j) Use and interpret statistical measures, tables and diagrams, for discrete and continuous data, using ICT where appropriate; k) Use statistical methods to investigate situations; l) Use probability to assess the likelihood of an outcome.	value calculate percentage parts of quantities and measurements evaluate one number as a percentage of another calculate results of percentage increases and decreases **be able to use common measures in different systems in problem solving** **The four rules** add subtract multiply divide **measures** money in different currencies time in different formats length, including distance, in imperial and metric units weight in imperial and metric units capacity in imperial and metric units temperature in Celsius and Fahrenheit convert units of measure between systems using scales, tables and conversion factors **Shapes** perimeters and areas of regular shapes areas of composite shapes volumes of regular shapes **Solve problems** recognise and use common 2D representation of 3D objects involving 2D shapes and parallel lines

GCSE Mathematics		Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes	Skills	Skill standards	Coverage and range	Outcomes
	and position-to-term definitions of the sequence; • use linear expressions to describe the nth term of an arithmetic sequence; • use the conventions for coordinates in the plane and plot points in all four quadrants, including using geometric information; • recognise and plot equations that correspond to straight-line graphs in the coordinate plane, including finding gradients; • understand that the form y = mx + c represents a straight line and that m is the gradient of the line and c is the value of the y-intercept; • understand the gradients of parallel lines; • find the intersection points of the graphs of a linear and quadratic function, knowing that these are the approximate solutions of the corresponding simultaneous equations representing the linear and quadratic functions; • draw, sketch, recognise graphs of simple cubic functions, the reciprocal function y = x1 with x0, the function y = k≠ x for integer values of x and simple positive values of k, the trigonometric functions y = sin x and y = cos x; • construct the graphs of simple loci; • construct linear, quadratic and other functions from real-life problems and plot their corresponding graphs; • discuss, plot and interpret graphs (which may be non-linear) modelling real situations; • generate points and plot graphs of simple quadratic functions, and use these to find approximate solutions. Geometry and measures			Define quantities money time length weight capacity temperature be able to use continuous and discrete data and statistical measure in problem solving Different sources complex tables composite charts scale diagrams line graphs with more than one line Averages mean mode median Different forms tables tree diagrams Different forms complex tables composite charts scale diagrams line graphs with more than one line

GCSE Mathematics		Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes	Skills	Skill standards	Coverage and range	Outcomes
	• recall and use properties of angles at a point, angles at a point on a straight line (including right angles), perpendicular lines and opposite angles at a vertex; • understand and use the angle properties of parallel and intersecting lines, triangles and quadrilaterals; • calculate and use the sums of the interior and exterior angles of polygons; • recall the properties and definitions of special types of quadrilateral, including square, rectangle, parallelogram, trapezium, kite and rhombus; • recognise reflection and rotation symmetry of 2D shapes; • understand congruence and similarity; • use Pythagoras' theorem in 2D and 3D; • use the trigonometrical ratios and the sine and cosine rules to solve 2D and 3D problems; • distinguish between centre, radius, chord, diameter, circumference, tangent, arc, sector and segment; • understand and construct geometrical proofs using circle theorems; • use 2D representations of 3D shapes; • describe and transform 2D shapes using single or combined rotations, reflections, translations, or enlargements by a positive scale factor then use positive fractional and negative scale factors and distinguish properties that are preserved under particular transformations; • use and interpret maps and scale drawings; • understand and use the effect of enlargement for perimeter, area and volume of shapes and solids;			

GCSE Mathematics		Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes	Skills	Skill standards	Coverage and range	Outcomes
	• interpret scales on a range of measuring instruments and recognise the inaccuracy of measurements; • convert measurements from one unit to another; • make sensible estimates of a range of measures; • understand and use bearings; • understand and use compound measures; • measure and draw lines and angles; • draw triangles and other 2D shapes using a ruler and protractor; • use straight edge and a pair of compasses to do constructions; • construct loci; • calculate perimeters and areas of shapes made from triangles and rectangles and other shapes; • calculate the area of a triangle using ½ ab sin C; • find circumferences and areas of circles; • calculate volumes of right prisms and of shapes made from cubes and cuboids; • solve mensuration problems involving more complex shapes and solids. **Statistics and probability** • understand and use statistical problem solving process/handling data cycle; • identify possible sources of bias; • design an experiment or survey; • design data-collection sheets, distinguishing between different types of data; • extract data from printed tables and lists; • design and use two-way tables for discrete and grouped data; • produce charts and diagrams for various data types;			

GCSE Mathematics		Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes	Skills	Skill standards	Coverage and range	Outcomes
	• calculate median, mean, range, quartiles and inter-quartile range, mode and modal class; • interpret a wide range of graphs and diagrams and draw conclusions; • look at data to find patterns and exceptions; • recognise correlation and draw and/or use lines of best fit by eye, understanding what these represent; • compare distributions and make inferences; • compare distributions and make inferences; • understand and use the vocabulary of probability and the probability scale; • understand and use estimates or measures of probability from theoretical models (including equally likely outcomes), or from relative frequency; • list all outcomes for single events, and for two successive events, in a systematic way and derive related probabilities; • identify different mutually exclusive outcomes and know that the sum of the probabilities of all these outcomes is 1; • know when to add or multiply two probabilities: if A and B are mutually exclusive, then the probability of A or B occurring is P(A) + P(B), whereas if A and B are independent events, the probability of A and B occurring is P(A) × P(B); • use tree diagrams to represent outcomes of compound events, recognising when events are independent; • compare experimental data and theoretical probabilities; • understand that if they repeat an experiment, they may – and usually will – get different outcomes, and that increasing sample size			

GCSE Mathematics		Functional Skills		Principles of Using Mathematical Techniques
Assessment Outcomes	Skills	Skill standards	Coverage and range	Outcomes
	generally leads to better estimates of probability and population characteristics.			

Appendix 2   Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centres and Training Providers homepage** on **www.cityandguilds.com**.

Centre Manual - Supporting Customer Excellence contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification, as well as updates and good practice exemplars for City & Guilds assessment and policy issues. Specifically, the document includes sections on:

*   The centre and qualification approval process
*   Assessment, internal quality assurance and examination roles at the centre
*   Registration and certification of candidates
*   Non-compliance
*   Complaints and appeals
*   Equal opportunities
*   Data protection
*   Management systems
*   Maintaining records
*   Assessment
*   Internal quality assurance
*   External quality assurance.

Our Quality Assurance Requirements encompasses all of the relevant requirements of key regulatory documents such as:
*   SQA Awarding Body Criteria (2007)
*   NVQ Code of Practice (2006)
and sets out the criteria that centres should adhere to pre and post centre and qualification approval.

Access to Assessment & Qualifications provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for candidates who are eligible for adjustments in assessment.

The **centre homepage** section of the City & Guilds website also contains useful information such on such things as:

- **Walled Garden:** how to register and certificate candidates on line
- **Events:** dates and information on the latest Centre events
- **Online assessment:** how to register for e-assessments.

City & Guilds
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www.cityandguilds.com

Useful contacts

UK learners General qualification information	T: +44 (0)844 543 0033 E: learnersupport@cityandguilds.com
Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: centresupport@cityandguilds.com
Single subject qualifications Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 F: +44 (0)20 7294 2404 (BB forms) E: singlesubjects@cityandguilds.com
International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: intops@cityandguilds.com
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: walledgarden@cityandguilds.com
Employer Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	T: +44 (0)121 503 8993 E: business@cityandguilds.com
Publications Logbooks, Centre documents, Forms, Free literature	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413