

CCEA GCSE Specification in Mathematics

For first teaching from September 2010

For first assessment from Summer 2011

For first award in Summer 2012

Subject Code: 2210

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Foreword

This booklet contains CCEA's General Certificate of Secondary Education (GCSE) Mathematics for first teaching from September 2010. We have designed this specification to meet the requirements of the following:

- GCSE Subject Criteria for Mathematics;
- GCSE Qualifications Criteria; and
- Common Criteria for all Qualifications.

The first full award based on this specification will be in summer 2012.

We are offering this specification as a unitised course. This development increases flexibility and choice for teachers and learners.

The first assessment for the following units will be available in summer 2011:

- Unit T1
- Unit T2
- Unit T3
- Unit T4.

The first assessment for Unit T5 and Unit T6 will be available in summer 2012.

We will notify centres in writing of any major changes to this specification. We will also publish changes on our website at www.ccea.org.uk

The version on our website is the most up-to-date version. Therefore, please note that the web version may be different from printed versions.

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1 Introduction

This specification sets out the content and assessment details for our GCSE Mathematics course. First teaching begins from September 2010, and we will make the first awards for this specification in 2012. You can view and download the latest version of this specification on our website at www.ccea.org.uk

The specification builds on the broad objectives of the Northern Ireland Curriculum. It provides a sound basis for further study of mathematics at AS/A2 level and related subjects at a more advanced level.

Please note that the teaching and assessment of GCSE Mathematics is changing from September 2010. These changes stem from the recommendations in the Smith report titled *Making Mathematics Count* (2004) and the Ofsted report titled *Mathematics: Understanding the Score* (2008). This specification, therefore:

- requires more problem-solving and applying mathematics than previous specifications; and
- introduces functional elements in mathematics.

1.1 Aims

This specification aims to encourage students to:

- develop knowledge, skills and understanding of mathematical methods and concepts;
- acquire and use problem-solving strategies;
- select and apply mathematical techniques and methods in mathematical, everyday and real-world situations;
- reason mathematically, make deductions and inferences, and draw conclusions;
- interpret and communicate mathematical information in a variety of forms appropriate to the information and context; and
- acquire a foundation appropriate to a further study of mathematics and other disciplines.

1.2 Key features

The key features of the specification appear below:

- This is a unitised specification. This means that students have the opportunity to sit at least one unit in the first year of teaching.
- This course offers opportunities to build on the skills and capabilities developed through the delivery of the Key Stage 3 curriculum in Northern Ireland.
- This course allows students the opportunity to develop and apply skills to real-life contexts. These skills are embedded within this specification.
- Units may be taken in the same examination series or different examination series.
- Each tier offers a choice of units that are suited to a wide range of abilities and enable students to demonstrate achievement.

- The assessment model enables students to monitor their progress and offers opportunities to improve their results.

Assessment Components	Percentage Assessment Weighting
Test T1 or Test T2	45%
Completion Test T5	55%

Assessment Components	Percentage Assessment Weighting
Test T3 or Test T4	45%
Completion Test T6	55%

1.3 Prior attainment

This specification builds upon the knowledge, understanding and skills developed through the statutory requirements for Mathematics (including Financial Capability) at Key Stage 3 in the Northern Ireland Curriculum.

1.4 Classification codes and subject combinations

Every specification is assigned a national classification code that indicates the subject area to which it belongs. The classification code for this qualification is 2210.

Progression to another school/college

Should a student take two qualifications with the same classification code, schools and colleges that they apply to may take the view that they have achieved only one of the two GCSEs. The same view may be taken if students take two GCSE qualifications that have different classification codes but have content that overlaps significantly. Students who have any doubts about their subject combinations should check with the schools and colleges that they wish to attend before embarking on their planned study.

Centres in England

Centres in England should also be aware that, for the purpose of the School and College Achievement and Attainment Tables, if a student enters for more than one GCSE qualification with the same classification code, only one grade (the highest) will count.

Additional Mathematics

Students who enter for this GCSE may also enter for GCSE Additional Mathematics in the same examination series.

2 Specification at a Glance

The table below summarises the assessment structure of this GCSE course. All units address all three assessment objectives, and, where appropriate, questions may require knowledge of and use of problem-solving strategies. Each written paper includes structured questions, questions set in context and some questions requiring the unprompted solution of multi-step problems.

2.1 Foundation Tier

Content	Assessment	Weighting	Availability
Unit T1:	External written examination <u>with</u> calculator 1 hour 30 minutes	45%	January and Summer (beginning summer 2011)
Unit T2:	External written examination <u>with</u> calculator 1 hour 30 minutes	45%	January and Summer (beginning summer 2011)
Unit T5: Foundation Completion Test (Compulsory)	2 external written examinations: <ul style="list-style-type: none"> • Paper 1 <u>without</u> calculator 1 hour • Paper 2 <u>with</u> calculator 1 hour 	55%	January and Summer (beginning summer 2012)

2.2 Higher Tier

Content	Assessment	Weighting	Availability
Unit T3:	External written examination <u>with</u> calculator 2 hours	45%	January and Summer (beginning summer 2011)
Unit T4:	External written examination <u>with</u> calculator 2 hours	45%	January and Summer (beginning summer 2011)
Unit T6: Higher Completion Test (Compulsory)	2 external written examinations: <ul style="list-style-type: none"> • Paper 1 <u>without</u> calculator 1 hour 15 minutes • Paper 2 <u>with</u> calculator 1 hour 15 minutes 	55%	January and Summer (beginning summer 2012)

3 Subject Content

3.1 Unit T1: Foundation Tier

This unit is targeted at grades E, F and G. Assessments based on this unit contain questions that are set in a functional context.

Content	Learning Outcomes
Number and Algebra	<p>Students should be able to:</p> <ul style="list-style-type: none"> • add, subtract, multiply and divide initially with whole numbers and progressing to numbers up to three decimal places; • order rational numbers; • use the concepts and vocabulary of factor, multiple and common factor; • use the terms square, positive and negative square root, cube and cube root; • use index notation for squares, cubes and powers of 10; • 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; • understand that percentage means ‘number of parts per 100’ and use this to compare proportions; • use calculators effectively and efficiently; • distinguish the different roles played by letter symbols in algebra, using the correct notation; • manipulate algebraic expressions by collecting like terms and by multiplying a single term over a bracket; and • solve simple equations.

Content	Learning Outcomes
<p>Geometry and Measures (cont.)</p> <p>Statistics and Probability</p>	<p>Students should be able to:</p> <ul style="list-style-type: none"> • make sensible estimates of a range of measures; • measure and draw lines and angles; • draw triangles and other 2D shapes using a ruler and protractor; • calculate perimeters and areas of triangles and rectangles; • calculate volumes of cubes and cuboids; • understand and use the statistical problem-solving process; • understand and use the handling data cycle; • 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, including pie charts and frequency tables; • calculate median, mean, range and mode, and understand their uses; • interpret a wide range of graphs and diagrams and draw conclusions; and • look at data to find patterns and exceptions.

3.2 Unit T2: Foundation Tier

This unit is targeted at grades C, D and E. Assessments based on this unit contain questions that are set in a functional context.

Students should have knowledge of the content of Unit T1 before undertaking study or assessment of this unit.

Content	Learning Outcomes
<p>Number and Algebra</p>	<p>Students should be able to:</p> <ul style="list-style-type: none"> • add, subtract, multiply and divide any number; • use the concepts and vocabulary of factor (divisor), multiple, common factor, highest common factor, least common multiple, prime number and prime factor decomposition; • use index laws for multiplication and division of integer powers; • add and subtract fractions, including mixed numbers; • recognise that recurring decimals are exact fractions and that some exact fractions are recurring decimals; • use percentages, including calculating simple interest; • interpret fractions, decimals and percentages as operations; • use ratio notation, including reduction to its simplest form and its various links to fraction notation; • manipulate algebraic expressions by: <ul style="list-style-type: none"> – collecting like terms; – multiplying a single term over a bracket; and – taking out common factors; • set up and solve simple equations; • use systematic trial and improvement to find approximate solutions of equations where there is no simple analytical method of solving them; and • generate terms of a sequence using term-to-term and position-to-term definitions of the sequence.

Content	Learning Outcomes
<p>Number and Algebra (cont.)</p> <p>Geometry and Measures</p> <p>Statistics and Probability</p>	<p>Students should be able to:</p> <ul style="list-style-type: none"> • use linear expressions to describe the n^{th} term of an arithmetic sequence; • recognise and plot equations that correspond to straight-line graphs in the coordinate plane, including finding their gradient; • calculate with money and solve problems in the context of finance (for example currency exchange rates, discount, profit and loss, current accounts, cheques, statements, VAT, lodgements and withdrawals); • understand and use the angle properties of parallel and intersecting lines; • calculate and use the sums of the interior and exterior angles of polygons; • understand congruence and similarity; • use Pythagoras' theorem in 2D problems; • understand and use bearings; • find circumferences and areas of circles; • calculate volumes of right prisms; • find the mid-point and length of a line given in 2D co-ordinates; • solve problems requiring calculations, including length, time, weight, capacity and temperature; • identify possible sources of bias; • design an experiment or survey; • find median, mean, range, mode and modal class; and • interpret and display information in a variety of ways, including scatter graphs, flow charts and frequency polygons.

Content	Learning Outcomes
Statistics and Probability (cont.)	Students should be able to: <ul style="list-style-type: none"><li data-bbox="533 360 1331 432">• recognise correlation and draw and/or use lines of best fit by eye, understanding what these lines represent;<li data-bbox="533 477 1161 510">• compare distributions and make inferences; and<li data-bbox="533 555 1158 589">• use relevant statistical functions on a calculator.

3.3 Unit T5: Foundation Tier Completion Test

This unit targets grades C, D, E, F and G. Assessments based on this unit contain questions that are set in a functional context.

Students should have knowledge of the content of Unit T1 before undertaking study or assessment of this unit.

Content	Learning Outcomes
<p>Number and Algebra</p>	<p>Students should be able to:</p> <ul style="list-style-type: none"> • approximate to specified or appropriate degrees of accuracy, including a given power of 10, number of decimal places and significant figures; • understand and use number operators (+, −, ×, ÷) and the relationships between them, including inverse and reciprocal operations and hierarchy of operations (for example BODMAS); • divide a quantity in a given ratio; • understand the meaning of the words equation, formula and expression and distinguish between them; • 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; • 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; • use index laws in algebra for multiplication and division of integer powers; and • calculate with money to include hire purchase, VAT, taxation, wages and salaries.

Content	Learning Outcomes
Statistics and Probability (cont.)	Students should be able to: <ul style="list-style-type: none"><li data-bbox="533 360 1348 506">• 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.

Content	Learning Outcomes
Statistics and Probability (cont.)	Students should be able to: <ul style="list-style-type: none"><li data-bbox="533 360 1246 398">• construct and use the cumulative frequency curve; and<li data-bbox="533 439 1230 510">• interpret and display information in a variety of ways, including box plots and stem and leaf diagrams.

3.6 Unit T6: Higher Tier Completion Test

This unit targets grades A*, A, B, C and D. Assessments based on this unit contain questions that are set in a functional context.

Students should have knowledge of all Foundation Tier content as well as the content of Unit T3 before undertaking study or assessment of this unit.

Content	Learning Outcomes
Number and Algebra	<p>Students should be able to:</p> <ul style="list-style-type: none"> • use surds and π in exact calculations; • change a recurring decimal to a fraction; • interpret, order and calculate with numbers written in standard index form; • know the meaning of and use the words equation, formula, identity and expression; • derive a formula, substitute numbers into a formula and change the subject of a formula, including cases where the subject appears in more than one term or where a power of the subject appears; • solve linear inequalities in one or two variables, and represent the solution set on a number line or suitable diagram; • 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 and recognise graphs of: <ul style="list-style-type: none"> – simple cubic functions; – the reciprocal function $y = \frac{1}{x}$ with $x \neq 0$; – the function $y = k^x$ for integer values of x and simple positive values of k; and – the trigonometric functions $y = \sin x$, $y = \cos x$ and $y = \tan x$; • construct simple loci; • construct linear, quadratic and other functions from real-life problems and plot their corresponding graphs; and • use growth and decay rates and display these graphically.

Content	Learning Outcomes
<p>Number and Algebra (cont.)</p> <p>Geometry and Measures</p> <p>Statistics and Probability</p>	<p>Students should be able to:</p> <ul style="list-style-type: none"> • use index laws in algebra for multiplication and division of integer, fractional and negative powers; • describe and transform 2D shapes using single or combined rotations, reflections, translations, or enlargements by a positive scale factor; • use positive fractional and negative scale factors; • distinguish properties that are preserved under particular transformations; • understand and use the effect of enlargement on perimeter area and volume of shapes and solids; • solve mensuration problems that involve more complex shapes (including arc length and area of sector) and solids (including cones, spheres and frustums); • understand and use formula for perimeter, area and volume by considering dimensions; • 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 $P(A) \times P(B)$; and • use tree diagrams to represent outcomes of compound events, recognising when events are independent.

4 Scheme of Assessment

4.1 Assessment opportunities

For a full award, candidates must complete two units: a unit test and a completion test:

- Foundation Tier candidates would normally enter for T1 **or** T2 **and** T5.
- Higher Tier candidates would normally enter for T3 **or** T4 **and** T6.

Candidates can choose to resit individual assessment units once. **However, the terminal requirement states that at least 40% of the assessment must be taken in the examination series in which the qualification is certificated.**

The final grade will include the unit result which satisfies this terminal requirement, even if there is a better score for an earlier attempt at the unit.

A Foundation Tier candidate may enter T1 and T2 in different series, and the better result will be counted towards the final award.

A Higher Tier candidate may enter T3 and T4 in different series, and the better result will be counted towards the final award.

Assessment Components	Percentage Assessment Weighting
Test T1 or Test T2	45%
Completion Test T5	55%

Assessment Components	Percentage Assessment Weighting
Test T3 or Test T4	45%
Completion Test T6	55%

Candidates entered for Higher Tier must also have studied all of the content of the Foundation Tier.

4.2 Assessment objectives

Below are the assessment objectives for this specification. Candidates must:

- recall and use their knowledge of the prescribed content (AO1);
- select and apply mathematical methods in a range of contexts (AO2); and
- interpret and analyse problems and generate strategies to solve them (AO3).

4.3 Assessment objective weightings

The table below sets out the assessment objective weightings for the overall GCSE qualification:

Assessment Objective	Component Weighting	
	Foundation Tier T1 and T5 or T2 and T5	Higher Tier T3 and T6 or T4 and T6
AO1	45–55%	45–55%
AO2	25–35%	25–35%
AO3	15–25%	15–25%

4.4 Functional elements

In this specification, the term *functional elements* refers to the skills and abilities candidates need in order to take an active and responsible role in their communities, everyday lives, workplaces and educational settings. Functional mathematics requires candidates to use mathematics effectively in a wide range of contexts.

Functional elements are embedded in this specification, which provides opportunities for candidates to develop and apply these mathematical skills to real-life contexts.

In line with **Assessment Objective 2** (‘select and apply mathematical methods in a range of contexts’), examination papers include questions set in real-life contexts. This allows candidates to demonstrate the extent to which they can apply mathematical skills commensurate with the level of entry.

In line with **Assessment Objective 3** (‘interpret and analyse problems and generate strategies to solve them’), examination papers assess functional elements by including questions that require unprompted solutions to multi-step problems. Papers also include both routine problems (those that are likely to be familiar to candidates) and ones that are non-routine (requiring learning to be adapted to address an unfamiliar situation).

In addition, some questions require interpretation at the start of solving a problem, requiring candidates to make sense of the situation so that they can select and use the appropriate mathematics and information. Interpretation also requires candidates to communicate the results of the analysis of a problem in the context in which it is set. Analysis requires them to accurately use the selected mathematics and information. The technical demand of the analysis they must demonstrate, and the range of knowledge, skills and techniques they must use to solve a given question, reflects the level of entry of that paper.

4.5 Functional elements weighting

Assessments in GCSE Mathematics allocate a weighting of 20–30 percent on Higher Tier and 30–40 percent on Foundation Tier for the functional elements of mathematics. Each unit's assessment contains questions set in a functional context.

4.6 Quality of written communication

In GCSE Mathematics, candidates must demonstrate the quality of their written communication. In particular, candidates must:

- ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear;
- select and use a form and style of writing appropriate to their purpose and to complex subject matter; and
- organise information clearly and coherently, using specialist vocabulary where appropriate.

Examiners assess the quality of candidates' written communication in their responses to questions that may require extended writing.

In addition, quality of written communication will be assessed in GCSE Mathematics through the candidate's ability to communicate clearly using both mathematical symbols and language and the written word. This may be through, for example, an explanation of the geometrical properties of a given shape or, for example, through concise mathematical argument in a multi-step problem.

Questions assessing the quality of written communication are indicated in the papers.

4.7 Reporting and grading

We report the results of individual assessment units on a uniform mark scale that reflects the assessment weighting of each unit. We determine the grades awarded by aggregating the uniform marks that candidates obtain on individual assessment units.

We award GCSE qualifications on an eight grade scale from A*–G, with A* being the highest. For candidates who fail to obtain a grade G, we report their results as unclassified (U).

There are two tiers of entry:

- We award grades C–G to candidates entered for the Foundation Tier.
- We award grades A*–D to candidates entered for the Higher Tier. We provide an allowed grade E as a 'safety net' for Higher Tier candidates just failing to secure a grade D.

To ensure access to a grade C at the Foundation Tier, candidates **must** take Unit T2 and Unit T5.

To ensure access to a grade A at the Higher Tier, we strongly recommended that candidates take Unit T4 and Unit T6.

The following table details the overall qualification grades available when units are combined as specified below:

Assessment Unit Combinations	Available Final Grades	Comment
T1 and T5	D–G	All grades in this range are available.
T2 and T5	C–G	All grades in this range are available.
T3 and T6	A–D(E)	All grades in this range are available. To achieve an overall A grade for the Higher Tier qualification, candidates must demonstrate exceptional performance on the Unit T3 exam <u>and</u> show clear evidence of sufficient work at grade A standard on the Unit T6 Completion Test.
T4 and T6	A*–D(E)	All grades in this range are available.

In judging which is the more appropriate tier of entry for a candidate, centres should consider the candidate's performance throughout the course.

We award grades that match the grade descriptions published by the regulatory authorities (see Section 5).

Tests T1, T2, T3 and T4 are timetabled on the same date and time. Therefore, candidates may enter only one of these examinations in each session.

Completion tests T5 and T6 are timetabled concurrently, on a different day to T1, T2, T3 and T4. For both the Foundation and Higher Tier completion tests, Paper 1 (without calculator) and Paper 2 (with calculator) are scheduled one immediately after the other.

4.8 Use of calculators

Calculators **must** be used in each Unit Test and **must** be used in Paper 2 of each Completion Test. Calculators are **not** permitted in Paper 1 of each Completion Test.

Calculators should have the following functions: $+$, $-$, \times , \div , $\sqrt{\quad}$, x^y and single memory. These are the minimum functions required.

For the Higher Tier papers, electronic calculators with trigonometric and relevant statistical functions must be used. For the Foundation Tier papers, electronic calculators with relevant statistical functions must be used.

5 Grade Descriptions

Grade descriptions are provided to give a general indication of the standards of achievement likely to have been shown by candidates awarded particular grades. The descriptions must be interpreted in relation to the content in the specification; they are not designed to define that content.

The grade awarded depends in practice upon the extent to which the candidate has met the assessment objectives overall. Shortcomings in some aspects of candidates' performance in the assessment may be balanced by better performances in others.

Grade	Description
A	<p>Candidates use a wide range of mathematical techniques, terminology, diagrams and symbols consistently, appropriately and accurately. Candidates are able to use different representations effectively, and they recognise equivalent representations (for example numerical, graphical and algebraic representations). Their numerical skills are sound, they use a calculator effectively and they demonstrate algebraic fluency. They use trigonometry and geometrical properties to solve problems.</p> <p>Candidates identify and use mathematics accurately in a range of contexts. They evaluate the appropriateness, effectiveness and efficiency of different approaches. Candidates choose methods of mathematical communication appropriate to the context. They are able to state the limitations of an approach or the accuracy of results. They use this information to inform conclusions within a mathematical or statistical problem.</p> <p>Candidates make and test hypotheses and conjectures. They adopt appropriate strategies to tackle problems (including those that are novel or unfamiliar), adjusting their approach when necessary. They tackle problems that bring together different aspects of mathematics and may involve multiple variables. They can identify some variables and investigate them systematically, the outcomes of which are used in solving the problem.</p> <p>Candidates communicate their chosen strategy. They can construct a rigorous argument, making inferences and drawing conclusions. They produce simple proofs and can identify errors in reasoning.</p>

Grade	Description
C	<p>Candidates use a range of mathematical techniques, terminology, diagrams and symbols consistently, appropriately and accurately. Candidates are able to use different representations effectively, and they recognise some equivalent representations (for example numerical, graphical and algebraic representations of linear functions; percentages; fractions; and decimals). Their numerical skills are sound and they use a calculator accurately. They apply ideas of proportionality to numerical problems and use geometric properties of angles, lines and shapes.</p> <p>Candidates identify relevant information, select appropriate representations and apply appropriate methods and knowledge. They are able to move from one representation to another in order to make sense of a situation. Candidates use different methods of mathematical communication.</p> <p>Candidates tackle problems that bring aspects of mathematics together. They identify evidence that supports or refutes conjectures and hypotheses. They understand the limitations of evidence and sampling, and the difference between a mathematical argument and conclusions based on experimental evidence.</p> <p>Candidates identify strategies to solve problems that involve a limited number of variables. They communicate their chosen strategy, making changes as necessary. They construct a mathematical argument and identify inconsistencies in a given argument or exceptions to a generalisation.</p>
F	<p>Candidates use some mathematical techniques, terminology, diagrams and symbols from the Foundation Tier consistently, appropriately and accurately. Candidates use some different representations effectively and can select information from them.</p> <p>Candidates complete straightforward calculations competently with and without a calculator. They use simple fractions and percentages, simple formulae and some geometric properties, including symmetry.</p> <p>Candidates work mathematically in everyday and meaningful contexts. They make use of diagrams and symbols to communicate mathematical ideas. Sometimes they check the accuracy and reasonableness of their results.</p> <p>Candidates test simple hypotheses and conjectures based on evidence. Candidates are able to use data to look for patterns and relationships. They state a generalisation arising from a set of results and identify counter-examples. They solve simple problems, some of which are non-routine.</p>

6 Links

6.1 Support

We provide the following resources to support this specification:

- our website;
- the GCSE Mathematics microsite within our website; and
- specimen papers and mark schemes.

Some support material from the previous specification may also remain useful.

We intend to expand our range of support to include the following:

- past papers;
- mark schemes;
- Chief Examiner's reports;
- guidance on progression from Key Stage 3;
- teachers' handbook with elaboration of content;
- schemes of work;
- support days for teachers;
- centre support visits; and
- an *Exemplification of Examination Performance* publication.

You can find our annual support programme of events and materials for Mathematics on our website at www.ccea.org.uk

6.2 Curriculum objectives

This specification addresses and builds upon the broad curriculum objectives for Northern Ireland, England and Wales. In particular, it enables students to:

- develop as individuals and contributors to the economy, society and environment by providing opportunities to:
 - create personal meaning through problem-solving, applying rules and developing numeracy skills;
 - express their own logic through working out problems;
 - build an appreciation of the diverse branches of mathematics;
 - explore and experiment creatively in a variety of situations;
 - develop the skills that are central to their understanding of and response to mathematical problems;
 - increase awareness of how mathematics influences behaviour and the world around them;
 - develop their own understanding of mathematics from situations and experiences that are different from their own;
 - develop their understanding of the theoretical and practical nature of mathematics;
 - improve their mathematical competence, financial capabilities and responsibilities; and
 - develop their awareness and understanding of the skills required to be successful in employment and business (and how these skills are transferable to the world of work);

- progress from Key Stage 3 Northern Ireland Curriculum requirements through:
 - knowledge and understanding of number; algebra; shape, space and measures; and handling data;
 - knowledge and understanding of personal finance issues;
 - skills that enable competent and responsible financial decision-making;
 - the application of mathematical skills to real life and work situations; and
 - the creative use of technology to enhance mathematical understanding;
- develop an understanding of spiritual, moral, ethical, social, legislative, economic and cultural issues by providing opportunities to:
 - explore and understand the underlying mathematical principles behind some of the natural forms and patterns in the world around us;
 - recognise how logical reasoning can be used to consider the consequences of particular decisions and choices;
 - work together on complex mathematical tasks and see that the collaborative result is often better than could be achieved individually;
 - appreciate that mathematical thought contributes to the development of our culture and is becoming increasingly central to our highly technological future; and
 - recognise the ways that mathematicians from many cultures have contributed to modern day mathematics; and
- develop an understanding of sustainable development, health and safety considerations and European developments through:
 - knowledge and understanding of the world around them through the appreciation of capacity;
 - recognising yield and loss through percentage increases and decreases;
 - investigating net totals and gross totals in relation to quantitative data;
 - making decisions and evaluating data to ascertain outcomes;
 - recognising aspects of health and healthy living through calculations and investigating data;
 - evaluating health and safety issues through the knowledge and understanding of accuracy and approximations;
 - using unit conversions to identify equivalence with imperial and metric measurements; and
 - recognising the diverse nature of mathematical development throughout Europe.

For further guidance on how this specification enables progression from the Northern Ireland Curriculum at Key Stage 3, go to our Mathematics microsite, which you can access at www.ccea.org.uk

6.3 Key Skills

This specification provides opportunities for students to develop and generate evidence for assessing the following nationally recognised Key Skills:

- Application of Number – Levels 1 and 2
- Communication – Levels 1 and 2
- Improving Own Learning and Performance – Levels 1 and 2
- Information and Communication Technology – Levels 1 and 2
- Problem-Solving – Levels 1 and 2
- Working with Others – Levels 1 and 2.

Achieving grades A*–C in GCSE Mathematics provides exemption for the external test in Application of Number Key Skills at Level 2.

Achieving grades D–G in GCSE Mathematics provides exemption for the external test in Application of Number Key Skills at Level 1.

You can find details of the current standards and guidance for each of these skills on our website at www.ccea.org.uk

6.4 Examination entries

Entry codes for this subject and details on how to make entries are available on our Qualifications Administration Handbook microsite, which you can access at www.ccea.org.uk

Alternatively, you can telephone our Examination Entries, Results and Certification team using the contact details provided in this section.

6.5 Equality and inclusion

We have considered the requirements of equalities legislation in developing this specification.

GCSE qualifications often require the assessment of a broad range of competences. This is because they are general qualifications and, as such, prepare students for a wide range of occupations and higher level courses.

The revised GCSE and qualification criteria were reviewed to identify whether any of the competences required by the subject presented a potential barrier to any students with disabilities. If this was the case, the situation was reviewed again to ensure that such competences were included only where essential to the subject. The findings of this process were discussed with disability and equality groups and with people with disabilities.

During the development process, we carried out an equality impact assessment. This was to ensure that we identified any additional potential barriers to equality and inclusion. Where appropriate, we have given consideration to measures to support access and mitigate against barriers.

Reasonable adjustments are made for students with disabilities in order to reduce barriers to access assessments. For this reason, very few students will have a complete barrier to any part of the assessment.

It is important to note that where access arrangements are permitted, they must not be used in any way that undermines the integrity of the assessment. **Information on reasonable adjustments is available in the Joint Council for Qualifications' document *Access Arrangements and Special Consideration: Regulations and Guidance Relating to Candidates Who Are Eligible for Adjustments in Examinations*.**

6.6 Contact details

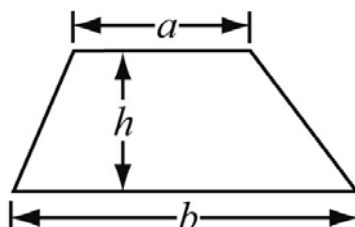
The following list provides contact details for relevant staff members and departments:

- Specification Support Officer: Nuala Braniff
(telephone: (028) 9026 1200, extension 2292, email: nbraniff@ccea.org.uk)
- Officer with Subject Responsibility: Ann Comac
(telephone: (028) 9026 1200, email: acomac@ccea.org.uk)
- Examination Entries, Results and Certification
(telephone: (028) 9026 1262, email: entriesandresults@ccea.org.uk)
- Examiner Recruitment
(telephone: (028) 9026 1243, email: appointments@ccea.org.uk)
- Distribution (past papers and support materials)
(telephone: (028) 9026 1242, email: cceadistribution@ccea.org.uk)
- Support Events Administration
(telephone: (028) 9026 1401, email: events@ccea.org.uk)
- Information Section (including Freedom of Information requests)
(telephone: (028) 9026 1200, email: info@ccea.org.uk)
- Business Assurance (appeals)
(telephone: (028) 9026 1244, email: appealsmanager@ccea.org.uk).

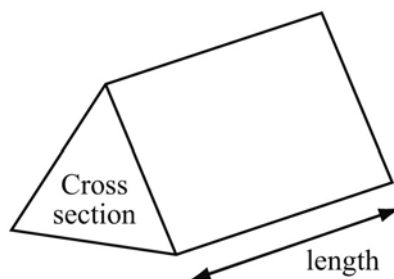
Appendix 1

Foundation Tier Formulae Sheet

Area of trapezium = $\frac{1}{2}(a + b)h$



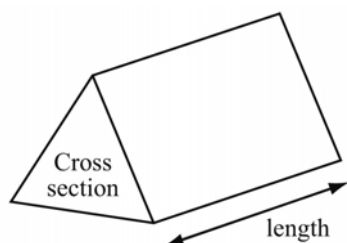
Volume of prism = area of cross section \times length



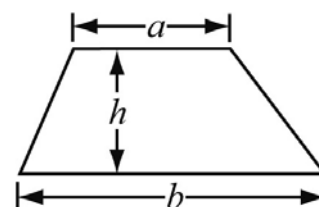
Appendix 2

Higher Tier Formulae Sheet

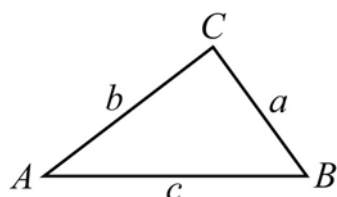
Volume of prism = area of cross section \times length



Area of trapezium = $\frac{1}{2}(a + b)h$

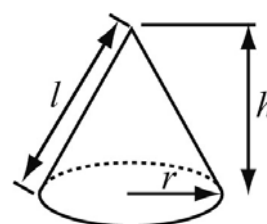


In any triangle ABC



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2}ab \sin C$

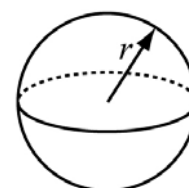
Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Summary of Changes since First Issue*(all document changes are marked in red)*

Revision History Number	Date of Change	Page Number	Change Made
Version 1	N/A	N/A	First Issue
Version 2	6 May 2010	5	2.2 – Removed sentence immediately below table about Completion Paper.
Version 2	6 May 2010	18	3.6 – Addition to Learning Outcomes: change a recurring decimal to a fraction.
Version 2	6 May 2010	18	3.6 – Addition to Learning Outcomes: use growth and decay rates and display these graphically.
Version 2	6 May 2010	20	4.1 – Removed sentence immediately below bullet points about Completion Test.
Version 2	6 May 2010	20	4.1 – Replaced paragraph about resitting assessments.
Version 2	6 May 2010	23	4.7 – Removed sentence immediately below table about assessment options.