

Edexcel Award in **Algebra**

Level 2 and Level 3



Algebra

Edexcel Level 2 Award in Algebra (AAL20)

Edexcel Level 3 Award in Algebra (AAL30)

Specification

Awards in Algebra

For first teaching from October 2012

Pearson Education Ltd is one of the UK's largest awarding organisations, offering academic and vocational qualifications and testing to schools, colleges, employers and other places of learning, both in the UK and internationally. Qualifications offered include GCSE, AS and A Level, NVQ and our BTEC suite of vocational qualifications, ranging from Entry Level to BTEC Higher National Diplomas. Pearson Education Ltd administers general qualifications.

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Acknowledgements

This specification has been produced by Edexcel on the basis of consultation with teachers, examiners, consultants and other interested parties. Edexcel would like to thank all those who contributed their time and expertise to its development.

References to third-party material made in this specification are made in good faith. We do not endorse, approve or accept responsibility for the content of materials, which may be subject to change, or any opinions expressed therein. (Material may include textbooks, journals, magazines and other publications and websites.)

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Introduction

The Edexcel Level 2 and Level 3 Awards in Algebra are designed for use in schools and colleges. They are part of a suite of mathematics qualifications offered by Edexcel.

Qualification objectives

The Edexcel Level 2 and Level 3 Awards in Algebra enable students to:

- develop a thorough knowledge and understanding of concepts in algebra and a sound foundation of mathematical techniques
- acquire confidence in their mathematical skills to move into further study in the subject or related areas
- enjoy using mathematics and become confident when using mathematics
- develop proficiency in algebra to support progression in their studies, in the workplace and for training.

The qualifications support progression to other level 2 and level 3 qualifications, such as GCSE and GCE. The awards indicate clear progression from level 2 and level 3.

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Specification at a glance

These Level 2 and Level 3 Awards consist of a single assessment at each level.

- Students are entered at either Level 2 or Level 3.
- Each qualification is awarded as pass or unclassified.

Level 2	Paper code: AAL20
<ul style="list-style-type: none"> • Externally assessed • Availability: January and June series • First assessment: June 2013 	100% of the Award
Overview of content <ul style="list-style-type: none"> • Algebraic manipulation and solution of equations • Inequalities and number sequences • Linear and curved graphs, distance and time graphs, speed and time graphs 	
Overview of assessment <ul style="list-style-type: none"> • The award is assessed through a 1 hour and 30 minutes examination set and marked by Edexcel. • The total number of marks for the paper is 80. • The qualification is awarded as pass or unclassified. • Calculators are not allowed. 	
Level 3	Paper code: AAL30
<ul style="list-style-type: none"> • Externally assessed • Availability: January and June series • First assessment: June 2013 	100% of the Award
Overview of content <ul style="list-style-type: none"> • Algebraic manipulation and solution of equations • Inequalities and number sequences • Linear and curved graphs, distance and time graphs, speed and time graphs 	
Overview of assessment <ul style="list-style-type: none"> • The award is assessed through a 2 hour examination set and marked by Edexcel. • The total number of marks for the paper is 90. • The qualification is awarded as pass or unclassified. • Calculators are not allowed 	

External assessment

In all examination papers:

- diagrams will not necessarily be drawn to scale and measurements should not be taken from diagrams unless instructions to this effect are given
- each student may be required to use mathematical instruments, eg ruler.

Qualification content

National Qualifications framework (NQF)

These qualifications comply with the requirements of the statutory regulation of qualifications in England, Wales and Northern Ireland which are prescribed by the regulatory authorities.

Knowledge, skills and understanding

The Edexcel Level 2 and Level 3 Awards in Algebra require students to demonstrate application and understanding of the following.

Level 2 content contains:

- 1 Roles of symbols**
- 2 Algebraic manipulation**
- 3 Formulae**
- 4 Linear equations**
- 5 Graph sketching**
- 6 Linear inequalities**
- 7 Number sequences**
- 8 Gradients of straight line graphs**
- 9 Straight line graphs**
- 10 Graphs for real life situations**
- 11 Simple quadratic functions**
- 12 Distance-time and speed-time graphs**

Knowledge, skills and understanding (continued)

Level 3 content contains:

- 1 Roles of symbols**
- 2 Algebraic manipulation**
- 3 Formulae**
- 4 Simultaneous equations**
- 5 Quadratic equations**
- 6 Roots of a quadratic equation**
- 7 Inequalities**
- 8 Arithmetic series**
- 9 Coordinate geometry**
- 10 Graphs of functions**
- 11 Graphs of simple loci**
- 12 Distance-time and speed-time graphs**
- 13 Direct and inverse proportion**
- 14 Transformations of functions**
- 15 Area under a curve**
- 16 Surds**

Assessment overview

- One written paper for each award is taken at the end of the course.
- The Level 2 award:
 - is assessed through a 1 hour and 30 minutes examination set and marked by Edexcel.
 - Calculators are **not** allowed
 - The total number of marks for the paper is 80.
- The Level 3 award:
 - is assessed through a 2 hour examination set and marked by Edexcel.
 - Calculators are **not** allowed
 - The total number of marks for the paper is 90.
- Each qualification is awarded at pass or unclassified.
- Available in January and June.
- First assessment: June 2013.

Edexcel Level 2 Award in Algebra

Overview

Content overview

This qualification contains:

- 1 Roles of symbols**
- 2 Algebraic manipulation**
- 3 Formulae**
- 4 Linear equations**
- 5 Graph sketching**
- 6 Linear inequalities**
- 7 Number sequences**
- 8 Gradients of straight line graphs**
- 9 Straight line graphs**
- 10 Graphs for real life situations**
- 11 Simple quadratic functions**
- 12 Distance-time and speed-time graphs**

Assessment overview

- One written paper for is taken at the end of the course.
- The Level 2 award:
 - is assessed through a 1 hour and 30 minutes examination set and marked by Edexcel.
 - Calculators are **not** allowed
 - The total number of marks for the paper is 80.
- Each qualification is awarded at pass or unclassified.
- Available in January and June.
- First assessment: June 2013.
- Calculators are not allowed in the assessment.

Level 2

What students need to learn:

Topic	Concepts and skills
1. Roles of symbols	<ol style="list-style-type: none">1. Distinguish between the roles played by letter symbols in algebra using the correct notation2. Distinguish in meaning between the words equation, formula and expression3. Write an expression to represent a situation in 'real life'
2. Algebraic manipulation	<ol style="list-style-type: none">1. Collect like terms2. Multiply a single term over a bracket3. Factorise algebraic expressions by taking out all common factors4. Use index laws for multiplication, division and raising a power to a power
3. Formulae	<ol style="list-style-type: none">1. Substitute numbers into a formula2. Change the subject of a formula where the subject only appears once
4. Linear equations	<ol style="list-style-type: none">1. Solve linear equations with integer coefficients where the variable appears on either side or on both sides of the equation2. Solve linear equations which include brackets, those that have negative signs occurring anywhere in the equation, those with negative and fractional solutions and those with fractional coefficients
5. Graph sketching	<ol style="list-style-type: none">1. Sketch graphs of quadratic functions, considering orientation and labelling the point of intersection with the y-axis, considering what happens to y for large positive and negative values of x
6. Linear inequalities	<ol style="list-style-type: none">1. Show inequalities on a number line, using solid circles to show inclusive inequalities and open circles to show exclusive inequalities2. Write down an inequality shown on a number line3. Solve simple linear inequalities in one variable

Topic	Concepts and skills
7. Number sequences	<ol style="list-style-type: none"> 1. Generate terms of a sequence using term-to-term definition or using position-to-term definition 2. Find and use the nth term of a linear arithmetic sequence
8. Gradients of straight line graphs	<ol style="list-style-type: none"> 1. Find the gradient of a straight line graph 2. Interpret the gradient of real-life graphs
9. Straight line graphs	<ol style="list-style-type: none"> 1. Recognise, plot and draw graphs of the form $y = mx + c$ 2. Given a straight line graph, find its equation
10 Graphs for real-life situations	<ol style="list-style-type: none"> 1. Understand that straight and curved graphs can represent real-life situations 2. Draw, and interpret information from graphs of real-life situations
11 Simple quadratic functions	<ol style="list-style-type: none"> 1. Plot graphs of simple quadratic functions 2. Find approximate solutions of a quadratic equation from the graph of the corresponding quadratic function
12 Distance-time and speed-time graphs	<ol style="list-style-type: none"> 1. Draw distance-time graphs and speed-time graphs 2. Interpret distance-time graphs and speed-time graphs 3. Understand that the gradient of a distance-time graph represents speed 4. Find speed and distance from information on a travel graph

Edexcel Level 3 Award in Algebra

Overview

Content overview

This qualification contains:

1. Roles of symbols
2. Algebraic manipulation
3. Formulae
4. Simultaneous equations
5. Quadratic equations
6. Roots of a quadratic equation
7. Inequalities
8. Arithmetic series
9. Coordinate geometry
10. Graphs of functions
11. Graphs of simple loci
12. Distance-time and speed-time graphs
13. Direct and inverse proportion
14. Transformations of functions
15. Area under a curve
16. Surds

Assessment overview

- One written paper is taken at the end of the course.
- The Level 3 award:
 - is assessed through a 2 hour examination set and marked by Edexcel.
 - Calculators are **not** allowed
 - The total number of marks for the paper is 90.
- Each qualification is awarded at pass or unclassified.
- Available in January and June.
- First assessment: June 2013
- Calculators are not allowed in the assessment.

The content of the Level 2 Award in Algebra is assumed knowledge and this content may be assessed in the Level 3 award.

Level 3

What students need to learn:

The content of the Level 2 Award in Algebra is assumed knowledge and this content may be assessed in the Level 3 award.

Topic	Concepts and skills
1. Roles of symbols	1. Distinguish between the roles played by letter symbols in algebra using the correct notation, and between the words equation, formula identity and expression
2. Algebraic manipulation	1. Multiply two linear expressions 2. Factorise expressions including quadratics and the difference of two squares, taking out all common factors 3. Use index laws to include fractional and negative indices 4. Simplify algebraic fractions 5. Complete the square in a quadratic expression
3. Formulae	1. Substitute numbers into formulae 2. Change the subject of a formula
4. Simultaneous equations	1. Solve simultaneous equations in two unknowns, where one may be quadratic, where one may include powers up to 2
5. Quadratic equations	1. Solve quadratic equations by factorisation or by using the formula or by completing the square 2. Know and use the quadratic formula
6. Roots of a quadratic equation	1. Understand the role of the discriminant in quadratic equations 2. Understand the sum and the product of the roots of a quadratic equation

Topic	Concepts and skills
7. Inequalities	<ol style="list-style-type: none"> 1. Solve linear inequalities, and quadratic inequalities 2. Represent linear inequalities in two variables on a graph
8. Arithmetic series	<ol style="list-style-type: none"> 1. Find and use the general term of arithmetic series 2. Find and use sum of an arithmetic series
9. Coordinate geometry	<ol style="list-style-type: none"> 1. Forms of the equation of a straight line graph 2. Conditions for straight lines to be parallel or perpendicular to each other
10. Graphs of functions	<ol style="list-style-type: none"> 1. Recognise, draw and sketch graphs of linear, quadratic, cubic, reciprocal, exponential and circular functions, and understand tangents and normals 2. Sketch graphs of quadratic, cubic, and reciprocal functions, considering asymptotes, orientation and labelling points of intersection with axes and turning points 3. Use graphs to solve equations
11. Graphs of simple loci	<ol style="list-style-type: none"> 1. Construct the graphs of simple loci eg circles and parabolas
12. Distance-time and speed-time graphs	<ol style="list-style-type: none"> 1. Draw and interpret distance-time graphs and speed-time graphs 2. Understand that the gradient of a distance-time graph represents speed and that the gradient of a speed-time graph represents acceleration 3. Understand that the area under the graph of a speed-time graph represents distance travelled
13. Direct and inverse proportion	<ol style="list-style-type: none"> 1. Set up and use equations to solve word and other problems using direct and inverse proportion and relate algebraic solutions to graphical representations of the equations
14. Transformations of functions	<ol style="list-style-type: none"> 1. Apply to the graph of $y = f(x)$ transformations of $y = f(x) \pm a$, $y = f(\pm ax)$, $y = f(x \pm a)$, $y = \pm af(x)$ for any function in x

Topic	Concepts and skills
15. Area under a curve	1. Find the area under a curve using the trapezium rule
16. Surds	1. Use and manipulate surds, including rationalising the denominator of a fraction written in the form $\frac{a}{b \pm \sqrt{c}}$

Assessment

Assessment summary

Level 2**Paper code: AAL20**

- One written paper.
- The paper is assessed through a 1 hour and 30 minute examination, set and marked by Edexcel.
- The total number of marks for the paper is 80.
- Calculators are **not** allowed
- The qualification is awarded at pass or unclassified.

Level 3**Paper code: AAL30**

- One written paper.
- The paper is assessed through a 2 hour examination, set and marked by Edexcel.
- The total number of marks for the paper is 90.
- Calculators are **not** allowed.
- The qualification is awarded at pass or unclassified.

Assessment objectives and weightings

Level 2		% in Award
AO1: demonstrate knowledge, understanding and skills in algebraic symbols and manipulation		25%-35%
AO2: demonstrate knowledge, understanding and skills in solving equations and inequalities and using substitution		35%-45%
AO3: demonstrate knowledge, understanding and skills in interpreting, drawing and sketching graphs and using graphs to solve equations		25%-35%
TOTAL		100%
Level 3		% in Award
AO1: demonstrate knowledge, understanding and skills in algebraic symbols and manipulation		25%-35%
AO2: demonstrate knowledge, understanding and skills in solving equations, and inequalities and using substitution		25%-35%
AO3: demonstrate knowledge, understanding and skills in interpreting, drawing and sketching graphs and using graphs to solve equations		35%-45%
TOTAL		100%

Relationship of assessment objectives to papers

Paper number	Assessment objective			
	A01	A02	A03	Total for A01, A02 and A03
Level 2	25%-35%	35%-45%	25%-35%	100%
Level 3	25%-35%	25%-35%	35%-45%	100%

Entering your students for assessment

Student entry

Students are entered at either Level 2 or Level 3.

Details of how to enter students for These qualifications can be found in Edexcel's *Information Manual*, copies of which (in CD format) are sent to all active Edexcel centres. The information can also be found on Edexcel's website: www.edexcel.com

Access arrangements and special considerations

Edexcel's policy on access arrangements and special considerations for GCE, GCSE, International GCSE, and Entry Level qualifications aims to enhance access to the qualifications for students with disabilities and other difficulties without compromising the assessment of skills, knowledge, understanding or competence.

The access arrangements and special arrangements for these qualification will comply with this policy.

Please see the Edexcel website (www.edexcel.com/sfc) for:

- the Joint Council for Qualifications (JCQ) policy Access Arrangements, Reasonable Adjustments and Special Considerations 2010-2011
- the forms to submit for requests for access arrangements and special considerations
- dates for submission of the forms.

Requests for access arrangements and special considerations must be addressed to:

Special Requirements
Edexcel
One90 High Holborn
London WC1V 7BH

Assessing your students

The first assessment opportunity for these qualifications will take place in the June 2013 series and in each January and June series thereafter for the lifetime of the qualifications.

Your students' assessment opportunities

All papers	June 2013	January 2014	June 2014	January 2015
Level 2 and Level 3	✓	✓	✓	✓

Awarding and reporting

The awarding and certification processes for these qualifications will comply with the current GCSE/GCE Code of Practice, which is published by the Office of Qualifications and Examinations Regulation (Ofqual). The Level 2 and Level 3 Awards qualifications will be pass only.

The first certification opportunity for the Edexcel Level 2 and Level 3 Awards in Algebra will be June 2013.

Students whose level of achievement is below the minimum judged by Edexcel to be of sufficient standard to be recorded on a certificate will receive an unclassified (U) result.

Language of assessment

Assessment of These qualifications will be available in English only. Assessment materials will be published in English only and all work submitted for examination must be produced in English.

Malpractice and plagiarism

For up-to-date advice on malpractice and plagiarism, please refer to the JCQ's *Suspected Malpractice in Examinations and Assessments: Policies and Procedures* document on the JCQ website: www.jcq.org.uk.

Student recruitment

Edexcel's access policy concerning recruitment to our qualifications is that:

- they must be available to anyone who is capable of reaching the required standard
- they must be free from barriers that restrict access and progression
- equal opportunities exist for all students.

Prior learning

For level 2, this qualification builds on the content, knowledge and skills developed in the Key Stage 3 Programme of Study for Mathematics as defined by the National Curriculum Orders for England.

For level 3, this qualification builds on the content, knowledge and skills taught as part of GCSE mathematics.

Guided learning hours

The number of guided learning hours (GLH) required for each qualification is 60-70 GLH.

These qualifications can be co-taught as part of other mathematics programmes, so the delivery time allocated may be more or less than this, according to delivery plans and individual learner needs.

Progression

At level 2, this qualification support progression to:

- GCSE in Mathematics (see Appendix 3)
- International GCSEs in Mathematics (see Appendix 4)
- Level 1/Level 2 Certificate in Mathematics (see Appendix 4)
- GCE AS Level Mathematics (see Appendix 5)
- further level 2 qualifications in other subjects, such as chemistry, biology, psychology and electronics
- further education or employment where mathematical skills are required.

At level 3, this qualification supports progression to:

- GCE AS and A Level Mathematics (see Appendix 5)
- further level 2 and level 3 qualifications in other subjects, such as biology, chemistry, psychology and electronics
- undergraduate degrees in numerate disciplines, such as the biosciences
- further education or employment where mathematical skills are required.

Level descriptors

The following level descriptions indicate the level of attainment characteristic of the given level. They give a general indication of the required learning outcomes at each specified level. The descriptors should be interpreted in relation to the content outlined in the specification; they are not designed to define that content. The level awarded will depend in practice upon the extent to which the candidate has met the Assessment Objectives overall. Shortcomings in some aspects of the examination may be balanced by better performance in others.

Level 2

Candidates find and describe in symbols the next term or the n th term of a sequence, where the rule is linear. They multiply two expressions of the form $(x + n)$ and they simplify the corresponding quadratic expressions. They represent inequalities using a number line. They formulate and solve linear equations with whole number coefficients. They manipulate simple algebraic formulae, equations and expressions. They use trial and improvement to solve cubic equations. They factorise simple expressions. Candidates sketch quadratic graphs and label them correctly. Candidates draw linear and quadratic graphs. They understand the role of m and c in $y = mx + c$. They interpret distance-time graphs from real-life situations.

Level 3

Candidates understand and use direct and inverse proportion. They manipulate algebraic formulae, equations and expressions, finding common factors and multiplying two linear expressions. In simplifying algebraic expressions, they use rules of indices for negative and fractional values. In finding formulae that approximately connect data, candidates express general laws in symbolic form. Candidates solve quadratic equations and understand the role of a , b and c in $ax^2 + bx + c = 0$. They draw and sketch a range of functions and understand tangents and normals. They manipulate and use surds.

Support and training

Edexcel support services

Edexcel has a wide range of support services to help you implement this qualification successfully.

ResultsPlus – ResultsPlus is an application launched by Edexcel to help subject teachers, senior management teams, and students by providing detailed analysis of examination performance. Reports that compare performance between subjects, classes, your centre and similar centres can be generated in 'one-click'. Skills maps that show performance according to the specification topic being tested are available for some subjects. For further information about which subjects will be analysed through ResultsPlus, and for information on how to access and use the service, please visit www.edexcel.com/resultsplus.

Ask the Expert – To make it easier for you to raise a query with us online, we have merged our **Ask Edexcel** and **Ask the Expert** services.

There is now one easy-to-use web query form that will allow you to ask any question about the delivery or teaching of Edexcel qualifications. You'll get a personal response, from one of our administrative or teaching experts, sent to the email address you provide.

We'll also be doing lots of work to improve the quantity and quality of information in our FAQ database, so you'll be able find answers to many questions you might have by searching before you submit the question to us.

Examzone – The Examzone site is aimed at students sitting external examinations and gives information on revision, advice from examiners and guidance on results, including remarking, resitting and progression opportunities. Further services for students – many of which will also be of interest to parents – will be available in the near future. Links to this site can be found on the main homepage at www.examzone.co.uk.

Training

A programme of professional development and training courses, covering various aspects of the specification and examination, will be arranged by Edexcel. Full details can be obtained from our website: www.edexcel.com

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Appendix 1: Wider curriculum

Signposting and development suggestions

Issue	Paper	Opportunities for development
Spiritual	All papers	<p>These qualifications will enable centres to provide courses in mathematics that will allow students to discriminate between truth and falsehood. As candidates explore mathematical models of the real world there will be many naturally arising moral and cultural issues, environmental and health and safety considerations and aspects of European developments for discussion, for example:</p> <ul style="list-style-type: none"> • use and abuse of statistics in the media • financial and business mathematics • how mathematics is used to communicate climate change • cultural and historical roots of mathematics • use of mathematics in cultural symbols and patterns.
Moral	All papers	
Ethical	All papers	
Social	All papers	
Legislative	All papers	
Economic	All papers	
Cultural	All papers	
Sustainable	All papers	
Health and safety	All papers	
European initiatives	All papers	

Appendix 2: Codes

Type of code	Use of code	Code number
National Qualifications Framework (NQF) codes	<p>Each qualification title is allocated a National Qualifications Framework (NQF) code.</p> <p>The National Qualifications Framework (NQF) code is known as a Qualification (QN). This is the code that features in the DfE Funding Schedule, Section 96, and is to be used for all qualification funding purposes. The QN is the number that will appear on the student's final certification documentation.</p>	<p>The QN for the qualifications in this publication are:</p> <p>Level 2: 600/6631/3</p> <p>Level 3: 600/6632/5</p>
Cash-in codes	<p>The cash-in code is used as an entry code to aggregate the student's scores to obtain the overall grade for the qualification. Centres will need to use the entry codes only when entering students for their qualification.</p>	<p>Level 2: AAL20</p> <p>Level 3: AAL30</p>
Entry codes	<p>The entry codes are used to:</p> <ul style="list-style-type: none"> enter a student for assessment aggregate the student's paper scores to obtain the overall grade for the qualification. 	<p>Please refer to the <i>Information Manual</i>, available on the Edexcel website.</p>

Appendix 3: Mapping to GCSE Mathematics content

Higher tier GCSE content is shown in bold

Level 2 Award in Algebra			GCSE Mathematics – Algebra content		
Topic	Concepts and skills	Progression Opportunities	Ref	Content descriptor	Concepts and skills
1. Roles of symbols	1. Distinguish between the roles played by letter symbols in algebra using the correct notation		A a	Distinguish the different roles played by letter symbols in algebra, using the correct notation	<ul style="list-style-type: none"> Use notation and symbols correctly
	2. Distinguish in meaning between the words equation, formula and expression		A b	Distinguish in meaning between the words 'equation', 'formula', ' identity ' and 'expression'	<ul style="list-style-type: none"> Select an expression/identity/equation/formulae from a list
	3. Write an expression to represent a situation in 'real life'				<ul style="list-style-type: none"> Write an expression

Level 2 Award in Algebra		GCSE Mathematics – Algebra content	
Topic	Concepts and skills	Progression Opportunities	Ref
2. Algebraic manipulation	1. Collection of like terms	Opportunity to extend this to include simplifying rational expressions by cancelling, adding, subtracting, and multiplying (Higher tier GCSE).	A c
	2. Multiplication of a single term over a bracket	Opportunity to extend this to include expanding the product of two linear expressions (Higher tier GCSE).	
	3. Factorise algebraic expressions by taking out all common factors	Opportunity to extend this to include quadratic expressions and using the difference of two squares (Higher tier GCSE).	
	4. Use index laws for multiplication, division and raising a power to a power	Opportunity to extend this to include fractional, zero and negative powers (Higher tier GCSE).	
Progression Opportunities	<ul style="list-style-type: none"> Once students have mastered the skills above, learning can be extended to include expressions and using algebraic manipulation to solve problems. 	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, factorise quadratic expressions including the difference of two squares and simplify rational expressions	<ul style="list-style-type: none"> Manipulate algebraic expressions by collecting like terms Multiply a single term over a bracket Factorise algebraic expressions by taking out common factors Use instances of index laws, including use of fractional, zero and negative powers, and powers raised to a power

Level 2 Award in Algebra		GCSE Mathematics – Algebra content			
Topic	Concepts and skills	Progression Opportunities	Ref	Content descriptor	Concepts and skills
3. Formulae	1. Substitute numbers into a formula	<p>Opportunity to extend this to include:</p> <ul style="list-style-type: none"> substituting positive and negative numbers into expressions such as $3x^2 + 4$ and $2x^3$ 	A f	Derive a formula, substitute numbers into a formula and change the subject of a formula	<ul style="list-style-type: none"> Substitute numbers into a formula
	2. Change the subject of a formula where the subject only appears once	<p>Opportunity to extend this to include:</p> <ul style="list-style-type: none"> cases where the subject is on both sides of the original formula, or where a power of the subject appears (Higher tier GCSE). 			
Progression Opportunities	<ul style="list-style-type: none"> Once students have mastered the skills above, learning can be extended to include deriving formulae and using formulae from mathematics and other subjects 				

Level 2 Award in Algebra		GCSE Mathematics – Algebra content			
Topic	Concepts and skills	Progression Opportunities	Ref	Content descriptor	Concepts and skills
4. Linear equations	1. Solve linear equations with integer coefficients where the variable appears on either side or on both sides of the equation		A d	Set up and solve simple equations including simultaneous equations in two unknowns	<ul style="list-style-type: none"> Solve linear equations, with integer coefficients, in which the unknown appears on either side or on both sides of the equation
	2. Solve linear equations which include brackets, those that have negative signs occurring anywhere in the equation, those with negative and fractional solutions and those with fractional coefficients				
Progression Opportunities	<ul style="list-style-type: none"> Once students have mastered the skills above, learning can be extended to include solving simultaneous equations both algebraically and graphically. 				

Level 2 Award in Algebra		GCSE Mathematics – Algebra content			
Topic	Concepts and skills	Progression Opportunities	Ref	Content descriptor	Concepts and skills
5. Graph sketching	1. Sketch graphs of quadratic functions, considering orientation and labelling the point of intersection with the y -axis, considering what happens to y for large positive and negative values of x .		A t	Generate points and plot graphs of simple quadratic functions, and use these to find approximate solutions	<ul style="list-style-type: none"> Generate points and plot graphs of simple quadratic functions, then more general quadratic functions
	2. Show inequalities on a number line, using solid circles to show inclusive inequalities and open circles to show exclusive inequalities.			Solve linear inequalities in one or two variables, and represent the solution set on a number line or coordinate grid	<ul style="list-style-type: none"> Solve simple linear inequalities in one variable, and represent the solution set on a number line Use the correct notation to show inclusive and exclusive inequalities
6. Linear inequalities	3. Write down an inequality shown on a number line		A g		
	4. Solve simple linear inequalities in one variable	Opportunity to extend this to include showing inequalities in two variables on a graph (Higher tier GCSE).			

Level 2 Award in Algebra		GCSE Mathematics – Algebra content			
Topic	Concepts and skills	Progression Opportunities	Ref	Content descriptor	Concepts and skills
7. Number sequences	1. Generate terms of a sequence using term-to-term definition or using position-to-term definition	<p>Opportunity to extend this to include:</p> <ul style="list-style-type: none"> describing the term to-term definition of a sequence in words find a specific term in a sequence using the position-to-term and term-to-term rules identifying which terms cannot be in a sequence. 	A i	Generate terms of a sequence using term-to-term and position-to-term definitions of the sequence	<ul style="list-style-type: none"> Generate simple sequences of numbers, squared integers and sequences derived from diagrams
	2. Find and use the n th term of a linear arithmetic sequence		A j	Use linear expressions to describe the n th term of an arithmetic sequence	<ul style="list-style-type: none"> Find the nth term of an arithmetic sequence Use the nth term of an arithmetic sequence

Level 2 Award in Algebra		GCSE Mathematics – Algebra content		
Topic	Concepts and skills	Ref	Content descriptor	
8. Gradients of straight line graphs	1. Find the gradient of a straight line graph	Progression Opportunities Opportunity to extend this to: <ul style="list-style-type: none"> understanding the gradients of parallel and perpendicular lines (Higher tier GCSE). 		
		A m	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	
	2. Interpret the gradient of real-life graphs	A I	Recognise and plot equations that correspond to straight-line graphs in the coordinate plane, including finding gradients	<ul style="list-style-type: none"> Find the gradient of a straight line from a graph Find the gradient of lines given by equations of the form $y = mx + c$
A I		Recognise and plot equations that correspond to straight-line graphs in the coordinate plane, including finding gradients	<ul style="list-style-type: none"> Analyse problems and use gradients to interpret how one variable changes in relation to another 	
		A s	Discuss, plot and interpret graphs (which may be non-linear) modelling real situations	<ul style="list-style-type: none"> Interpret information presented in a range of linear and non-linear graphs

Level 2 Award in Algebra		GCSE Mathematics – Algebra content			
Topic	Concepts and skills	Progression Opportunities	Ref	Content descriptor	Concepts and skills
9. Straight line graphs	1. Recognise, plot and draw graphs of the form $y = mx + c$	<ul style="list-style-type: none"> Opportunity to extend this to include plotting and drawing graphs of functions 			<ul style="list-style-type: none"> Draw, label and scale axes Recognise that equations of the form $y = mx + c$ correspond to straight-line graphs in the coordinate plane Plot and draw graphs of straight lines with equations of the form $y = mx + c$
	2. Given a straight line graph, find its equation		A m	<p>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</p>	<ul style="list-style-type: none"> Interpret and analyse a straight line graph Understand that the form $y = mx + c$ represents a straight line
Progression Opportunities	<ul style="list-style-type: none"> Once students have mastered the skills above, learning can be extended to include analysing problems using straight line graphs. 				

Level 2 Award in Algebra		GCSE Mathematics – Algebra content			
Topic	Concepts and skills	Progression Opportunities	Ref	Content descriptor	Concepts and skills
10. Graphs for real-life situations	1. Understand that straight and curved graphs can represent real-life situations		A r	Construct linear, quadratic and other functions from real-life problems and plot their corresponding graphs	<ul style="list-style-type: none"> • Draw straight line graphs for real-life situations <ul style="list-style-type: none"> – ready reckoner graphs – conversion graphs – fuel bills – fixed charge (standing charge) and cost per unit
	2. Draw, and interpret information from graphs of real-life situations		A s	Discuss, plot and interpret graphs (which may be non-linear) modelling real situations	<ul style="list-style-type: none"> • Interpret straight line graphs for real-life situations <ul style="list-style-type: none"> – ready reckoner graphs – conversion graphs – fuel bills – fixed charge (standing charge) and cost per unit • Interpret information presented in a range of linear and non-linear graphs

Level 2 Award in Algebra		GCSE Mathematics – Algebra content			
Topic	Concepts and skills	Progression Opportunities	Ref	Content descriptor	Concepts and skills
1.1.Simple quadratic functions	1. Plot graphs of simple quadratic functions		A t	Generate points and plot graphs of simple quadratic functions, and use these to find approximate solutions	<ul style="list-style-type: none"> • Generate points and plot graphs of simple quadratic functions, then more general quadratic functions • Find approximate solutions of a quadratic equation from the graph of the corresponding quadratic function
	2. Find approximate solutions of a quadratic equation from the graph of the corresponding quadratic function				
Progression Opportunities	<p>Once students have mastered the skills above, learning can be extended to include:</p> <ul style="list-style-type: none"> - Select and use the correct mathematical techniques to draw quadratic graphs - 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 				

Level 2 Award in Algebra		GCSE Mathematics – Algebra content			
Topic	Concepts and skills	Progression Opportunities	Ref	Content descriptor	Concepts and skills
12.Distance-time and speed-time graphs	1. Draw distance-time graphs and speed-time graphs		A r	Construct linear, quadratic and other functions from real-life problems and plot their corresponding graphs	<ul style="list-style-type: none"> Draw straight line graphs for real-life situations Distance-time graphs
	2. Interpret distance-time graphs and speed-time graphs				
	3. Understand that the gradient of a distance-time graph represents speed				
	4. Find speed and distance from information on a travel graph				

Appendix 4: Mapping to International GCSE and Level 1/Level 2 Certificate in Mathematics qualifications

Below is a sub-set of the content (relating to Algebra) within the International GCSE Mathematics A and the Level 1/level 2 Certificate in Mathematics qualifications. The content common across the above specifications and the Level 2 Award in Algebra is shown in purple.

There are opportunities to progress from content within Level 2 Award in Algebra to content within the International and Certificate specifications. These possible progression opportunities are shown in green.

Higher tier International GCSE and Certificate content is shown in bold.

2. Equations, Formulae and Identities

2.1 Use of Symbols

understand that symbols may be used to represent numbers in equations or variables in expressions and formulae (Ref 1.1)

understand that algebraic expressions follow the generalised rules of arithmetic

use index notation for positive integer powers (Ref 2.4)

use index laws in simple cases (Ref 2.4)

use index notation involving fractional powers

2.2 Algebraic Manipulation

evaluate expressions by substituting numerical values for letters

collect like terms (Ref 2.1)

multiply a single term over a bracket (Ref 2.2)

take out single common factors (Ref 2.3)

expand the product of two linear expressions

understand the concept of a quadratic expression and be able to factorise such expressions

manipulate algebraic fractions where the numerator and/or the denominator can be numeric, linear or quadratic

2.3 Expressions and Formulae

understand that a letter may represent an unknown number or a variable (Ref 1.1)

use correct notational conventions for algebraic expressions and formulae

substitute positive and negative integers, decimals and fractions for words and letters in expressions and formulae (Ref 3.1)

use formulae from mathematics and other real life contexts expressed initially in words or diagrammatic form and converting to letters and symbols

understand the process of manipulating formulae to change the subject where the subject may appear twice or a power of the subject occurs (Ref 3.2 only where subject appears once)

2.4 Linear Equations

solve linear equations with integer or fractional coefficients in one unknown in which the unknown appears on either side or both sides of the equation (Ref 4.1, 4.2)

set up simple linear equations from data given

2.5 Proportion

set up problems involving direct or inverse proportion and relate algebraic solutions to graphical representation of the equations

2.4 Simultaneous Linear Equations

calculate the exact solution of two simultaneous equations in two unknowns

interpret the equations as lines and the common solution as the point of intersection

2.6 Quadratic Equations

solve quadratic equations by factorisation

solve quadratic equations by using the quadratic formula

form and solve quadratic equations from data given in a context

solve simultaneous equations in two unknowns, one equation being linear and the other equation being quadratic

2.8 Inequalities

understand and use the symbols $>$, $<$, \geq and \leq

understand and use the convention for open and closed intervals on a number line (Ref 6.1)

solve simple linear inequalities in one variable and represent the solution set on a number line (Ref 6.3)

represent simple linear inequalities on rectangular cartesian graphs

identify regions on rectangular cartesian graphs defined by simple linear inequalities

solve quadratic inequalities in one unknown and represent the solution set on a number line

identify harder examples of regions defined by linear inequalities

3. Sequences, Functions and Graphs

3.1 Sequences

generate terms of a sequence using term-to-term and position-to-term definitions of the sequence (Ref 7.1)

find subsequent terms of an integer sequence

Use linear expressions to describe the n th term of an arithmetic sequence (Ref 7.2)

3.2 Graphs

interpret information presented in a range of linear and non-linear graphs (Ref 10.1)

understand and use conventions for rectangular cartesian coordinates

plot points (x, y) in any of the four quadrants of a graph

locate points with given coordinates

determine the coordinates of points identified by geometrical information

determine the coordinates of the midpoint of a line segment given the coordinates of the two end points

draw and interpret straight line conversion graphs

understand the concept of a gradient of a straight line (Ref 8.1, 8.2)

recognise that equations of the form $y = mx + c$ are straight line graphs (Ref 9.1, 9.2)

generate points and plot graphs of linear and quadratic functions (Ref 9.1, 11.1)

plot and draw graphs with equation: $y = Ax^3 + Bx^2 + Cx + D$ in which

(i) the constants are integers and some could be zero

(ii) the letters x and y can be replaced with any other two letters

or: $y = Ax^3 + Bx^2 + Cx + D + E/x + F/x^2$

in which

(i) the constants are numerical and at least three of them are zero

(ii) the letters x and y can be replaced with any other two letters

find the gradients of non-linear graphs

Find the intersection points of two graphs, one linear (y_1) and one non-linear (y_2), and recognise that the solutions correspond to the solutions of $y_2 - y_1 = 0$ (Ref 5.1)

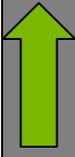
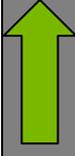
Calculate a gradient of a straight line given two coordinates (Ref 8.1)

Recognise that equations of the form $y = mx + c$ are straight line graphs with gradient m and intercept on the y axis at the point $(0, c)$ (Ref 9.1)

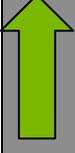
find the equation of a straight line parallel to a given line

Appendix 5: Mapping of GCE AS Level Core Mathematics 1 (C1)

Progression in terms of content and skills is illustrated in the grid below, from the Level 2 to Level 3 Awards in Algebra to Core Mathematics 1 within GCE AS and A level Mathematics.

Level 2 Award in Algebra 		Level 3 Award in Algebra 		Core Mathematics 1	
				1. Algebra and functions	
2.4	Use index laws for multiplication, division and raising power to a power	2.3	Use index laws to include fractional and negative indices	Laws of indices for all rational exponents.	
		16.1	Use and manipulate surds, including rationalising the denominator of a fraction written in the form $\frac{a}{b \pm \sqrt{c}}$	Use and manipulation of surds.	
11.1	Plot graphs of simple quadratic functions	10.1	Recognise, draw and sketch graphs of linear, quadratic, cubic, reciprocal, exponential and circular functions, and understand tangents and normals	Quadratic functions and their graphs.	
11.2	Find approximate solutions of a quadratic equation from the graph of the corresponding quadratic function	10.2	Sketch graphs of quadratic, cubic, and reciprocal functions, considering asymptotes, orientation and labeling points of intersection with axes and turning points		

Level 2 Award in Algebra 	Level 3 Award in Algebra 	Core Mathematics 1
		1. Algebra and functions continued
	6.1 Understand the role of the discriminant in quadratic equations	The discriminant of a quadratic function.
	5.1 Solve quadratic equations by factorisation or by completing the square	Completing the square. Solution of quadratic equations.
	5.2 Know and use the quadratic formula	
	4.1 Solve simultaneous equations in two unknowns, where one may be quadratic, where one may include powers up to 2.	Simultaneous equations: analytical solution by substitution.
6.3 Solve simple linear inequalities in one variable	7.1 Solve linear inequalities, and quadratic inequalities	Solution of linear and quadratic inequalities.
2.1 Collection of like terms	2.1 Multiply two linear expressions	Algebraic manipulation of polynomials, including expanding brackets and collecting like terms, factorisation.
2.2 Multiplication of a single term over a bracket	2.2 Factorise expressions including quadratics and the difference of two squares, taking out all common factors	
2.3 Factorise algebraic expressions by taking out all common factors	2.3 Use index laws to include fractional and negative indices	
2.4 Use index laws for multiplication, division and raising a power to a power	2.4 Simplify algebraic fractions	

Level 2 Award in Algebra 	Level 3 Award in Algebra 	Core Mathematics 1
		1. Algebra and functions continued Graphs of functions; sketching curves defined by simple equations. Geometrical interpretation of algebraic solution of equations. Use of intersection points of graphs of functions to solve equations.
5.1 Sketch graphs of quadratic functions, considering orientation and labelling the point of intersection with the y-axis, considering what happens to y for large positive and negative values of x 5.2 Plot graphs of simple quadratic functions 5.3 Find approximate solutions of a quadratic equation from the graph of the corresponding quadratic function	10.1 Recognise, draw and sketch graphs of linear, quadratic, cubic, reciprocal, exponential and circular functions, and understand tangents and normals 10.2 Sketch graphs of quadratic, cubic, and reciprocal functions, considering asymptotes, orientation and labeling points of intersection with axes and turning points 10.3 Use graphs to solve equations 14.1 Apply to the graph of $y = f(x)$ transformations of $y = f(x) \pm a$, $y = f(\pm ax)$, $y = f(x \pm a)$, $y = \pm af(x)$ for any function in x	Knowledge of the effect of simple transformations on the graph of $y = f(x)$ as represented by $y = af(x)$, $y = f(x) + a$, $y = f(x + a)$, $y = f(ax)$.

Level 2 Award in Algebra 	Level 3 Award in Algebra 	Core Mathematics 1
8.1 Find the gradient of a straight line graph 9.1 Recognise, plot and draw graphs of the form $y = mx + c$ 9.2 Given a straight line graph, find its equation	9.1 Forms of the equation of a straight line graph 9.2 Conditions for straight lines to be parallel or perpendicular to each other	2. Coordinate geometry in the (x, y) plane Equation of a straight line, including the forms $y - y_1 = m(x - x_1)$ and $ax + by + c = 0$
		Conditions for two straight lines to be parallel or perpendicular to each other.
7.1 Generate terms of a sequence using term to term definition or using position to term definition		3. Sequences and series Sequences, including those given by a formula for the nth term and those generated by a simple relation of the form $x_{n+1} = f(x_n)$.
7.2 Find and use the n th term of a linear arithmetic sequence		Arithmetic series, including the formula for the sum of the first n natural numbers.

Progression to AS and A level Mathematics

Core Mathematics 2 (C2) requires a knowledge of the content outlined in Core Mathematics 1 (C1). Likewise C1 and C2 content is a prerequisite for C3, and C1, C2 and C3 content a prerequisite for C4. C1 and C2 are compulsory units for GCE AS level Mathematics and C1, C2, C3 and C4 compulsory units for A level Mathematics.

From the mapping above, it can be inferred that the:

- Level 2 Algebra Awards support progression to GCE AS level Mathematics as the build the foundations in required to access much of the C1 content which is required for C2.
- Level 3 Algebra Awards support progression to GCE AS and A level Mathematics as many of the skills taught are within the C1 content which is required for C2, C3 and C4.

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