

# IGCSE

## Mathematics (Specification B)

### Specification

## Edexcel IGCSE in Mathematics (Specification B) (4MB0)

First examination 2011

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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.

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## Introduction

The Edexcel International General Certificate of Secondary Education (IGCSE) in Mathematics (Specification B) is designed for use in schools and colleges. It is part of a suite of IGCSE qualifications offered by Edexcel.

The range of grades available for this specification is the IGCSE Higher Tier, A\* – D with a ‘safety net’ grade E available.

## Key subject aims

The Edexcel IGCSE in Mathematics (Specification B) encourages students to:

- develop knowledge and understanding of mathematical concepts and techniques
- acquire a foundation of mathematical skills for further study in the subject or related areas
- enjoy using and applying mathematical techniques and concepts, and become confident to use mathematics to solve problems
- appreciate the importance of mathematics in society, employment and study.

## About this specification

### Key features and benefits of the specification

The Edexcel IGCSE in Mathematics (Specification B) has been developed to:

- enable students to acquire knowledge and skills with confidence, satisfaction and enjoyment
- provide papers that are balanced in terms of topics and difficulty
- provide a solid basis for students wishing to progress to Edexcel's AS and Advanced GCE, or equivalent qualifications.

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# Specification at a glance

The Edexcel IGCSE in Mathematics (Specification B) comprises of two externally assessed papers.

This specification is offered through a single tier.

Questions are targeted at grades in the range A\* – D.

There is a ‘safety net’ grade E for students who narrowly fail to achieve grade D.

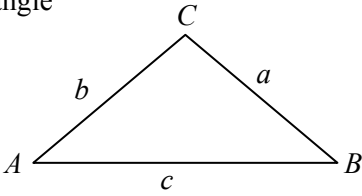
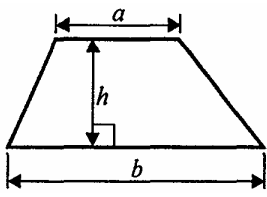
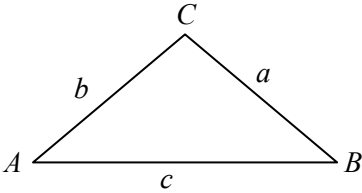
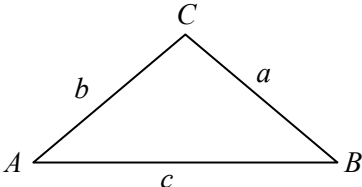
Students who fail to achieve grade E will be awarded Ungraded.

<b>Paper 1</b>	<b>Paper code: 4MB0/01</b>
<ul style="list-style-type: none"> <li>• Externally assessed</li> <li>• Availability: January and June series</li> <li>• First assessment: June 2011</li> </ul>	<b>33⅓% of the total IGCSE marks</b>
<p>Overview of content</p> <ul style="list-style-type: none"> <li>• Number and algebra</li> <li>• Geometry and trigonometry</li> <li>• Statistics and probability</li> </ul>	
<p>Overview of assessment</p> <ul style="list-style-type: none"> <li>• The assessment will be 1 hour 30 minutes.</li> <li>• The paper will carry a total of 100 marks.</li> <li>• The paper will consist of around 26 to 30 questions with varying mark allocations per question, which will be stated on the paper.</li> <li>• The paper will address all the Assessment Objectives.</li> <li>• The overall assessment will have approximately equal marks available for each of the targeted grades.</li> <li>• Diagrams will not necessarily be drawn to scale and measurements should not be taken from diagrams unless instructions to this effect are given.</li> <li>• Students may need to use mathematical instruments eg pair of compasses, ruler, protractor.</li> <li>• Calculators are allowed.</li> <li>• The paper will contain questions from any part of the specification content, and the solution of any question may require knowledge of more than one section of the specification content.</li> <li>• Questions will be set in SI units.</li> </ul>	

<b>Paper 2</b>	<b>Paper code: 4MB0/02</b>
<ul style="list-style-type: none"> <li>• Externally assessed</li> <li>• Availability: January and June series</li> <li>• First assessment: June 2011</li> </ul>	<b>66% of the total IGCSE marks</b>
<p>Overview of content</p> <ul style="list-style-type: none"> <li>• Number and algebra</li> <li>• Geometry and trigonometry</li> <li>• Statistics and probability</li> </ul>	
<p>Overview of assessment:</p> <ul style="list-style-type: none"> <li>• The assessment will be 2 hours and 30 minutes.</li> <li>• The paper will carry a total of 100 marks.</li> <li>• The paper will consist of about 12 questions with varying mark allocations per question, which will be stated on the paper.</li> <li>• The paper will address all the Assessment Objectives.</li> <li>• The overall assessment will have approximately equal marks available for each of the targeted grades.</li> <li>• Diagrams will not necessarily be drawn to scale and measurements should not be taken from diagrams unless instructions to this effect are given.</li> <li>• Students may need to use mathematical instruments, for example pair of compasses, ruler, protractor.</li> <li>• Calculators are allowed.</li> <li>• The paper will contain questions from any part of the specification content, and the solution of any question may require knowledge of more than one section of the specification content.</li> <li>• Questions will be set in SI units.</li> <li>• Where a question on Paper 2 requires the use of one of the following formulae, that formula will be given at the end of the question.</li> </ul>	

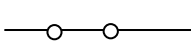
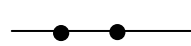


## Formulae to be given in Paper 2

Circumference of a circle	$2\pi r$
Area of circle	$\pi r^2$
Area of triangle 	$\frac{1}{2} bc \sin A$
Area of trapezium 	$\frac{1}{2} (a + b)h$
Curved surface area of right circular cylinder	$2\pi rh$
Curved surface area of right circular cone	$\pi rl$
Surface area of sphere	$4\pi r^2$
Volume of pyramid	$\frac{1}{3} \times \text{base area} \times \text{height}$
Volume of right circular cone	$\frac{1}{3} \pi r^2 h$
Volume of sphere	$\frac{4}{3} \pi r^3$
Sum of interior angles of polygon	$(2n - 4)$ right angles
Solutions of $ax^2 + bx + c = 0$	$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$
Determinant of matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$	$ad - bc$
Inverse of matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$	$\frac{1}{ad - bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$
Sine rule 	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
Cosine rule 	$a^2 = b^2 + c^2 - 2bc \cos A$

## Notation

The notation used will include the following.

$\{ \}$	the set of
$n(A)$	the number of elements in the set $A$
$\{x : \}$	the set of all $x$ such that
$\in$	is an element of
$\notin$	is not an element of
$\emptyset$	the empty (null) set
$\mathcal{E}$	the universal set
$\cup$	union
$\cap$	intersection
$\subset$	is a subset of
$A'$	the complement of the set $A$
$PQ$	operation $Q$ followed by operation $P$
$f: A \rightarrow B$	is a function under which each element of set $A$ has an image in set $B$
$f: x \mapsto y$	$f$ is a function under which $x$ is mapped to $y$
$f(x)$	the image of $x$ under the function $f$
$f^{-1}$	the inverse relation of the function $f$
$fg$	the function $g$ followed by function $f$ , ie $f(g(x))$
	open interval on the number line
	closed interval on the number line
$\mathbf{a}$	the vector $\mathbf{a}$
$\overrightarrow{AB}$	the vector represented in magnitude and direction by $\overrightarrow{AB}$ the vector from point $A$ to point $B$
$ a $	the magnitude of vector $\mathbf{a}$

## Calculators

Students are expected to have access to a calculator with at least the following keys:

$+$ ,  $-$ ,  $\times$ ,  $\div$ ,  $\pi$ ,  $x^2$ ,  $\sqrt{x}$ ,  $\frac{1}{x}$ ,  $x^y$ , sine, cosine and tangent and their inverses in degrees and decimals of a degree.

Calculators with any of the following facilities are prohibited in any examination:

- databanks; retrieval of text or formulae; QWERTY keyboards; built-in symbolic algebra manipulations; symbolic differentiation or integration.



# Qualification content

## Knowledge, skills and understanding

This Edexcel IGCSE in Mathematics (Specification B) requires students to demonstrate application and understanding of:

### Number and algebra

- The use of numerical skills in a purely mathematical way and in real-life situations.
- Set theory and notation.
- The use of letters as equivalent to numbers and as variables.
- The distinction between expressions, equations and formulae.
- The use of algebra to set up and solve problems.
- Techniques of algebraic manipulation.
- The use of functions of one variable.
- The construction and interpretation of graphs.
- The use of matrices.

### Geometry and trigonometry

- The properties of angles.
- A range of transformations in a plane.
- The application of the metric system in real-life problems.
- The ideas of space and shape.
- The use of rulers, compasses and protractors appropriately to construct shapes.
- The use of vectors and vector notation.
- The use of trigonometry in two and three dimensional problems.

### Statistics and probability

- The basic ideas of statistical techniques.
- The basic ideas of probability.

## Content overview

- Number
  - Number
  - Sets
- Algebra
  - Algebra
  - Functions
  - Matrices
- Geometry
  - Geometry
  - Mensuration
  - Vectors
  - Trigonometry
- Statistics

## Assessment overview

- Two written papers set and marked by Edexcel
- Paper 1 lasts 1 hour 30 minutes, Paper 2 lasts 2 hours 30 minutes
- The total number of marks for each paper is 100
- Paper 1 weighted at  $33\frac{1}{3}\%$  of the qualification, Paper 2 weighted at  $66\frac{2}{3}\%$  of the qualification
- Both papers targeted at grades A\* – D

## Specification content

1	Number	Notes
	<p>The ordinary processes of number manipulation</p> <p>Prime numbers, factors, multiples</p> <p>Indices, powers and roots</p> <p>Simple manipulation of surds</p> <p>Rationalising the denominator where the denominator is a pure surd</p> <p>Natural numbers, integers, rational and irrational numbers</p> <p>Weights, measures and money</p> <p>Fractions, decimals, ratio, proportion and percentage</p>	<p>The ‘four operations’ and combination of them by use of brackets</p> <p>To include finding HCF and LCM in simple cases where they can be found by inspection</p> <p>Use index notation and index laws for multiplication and division involving integer, fractional and negative powers</p> <p>Students should understand what surds represent and their use for exact answers</p> <p>Manipulation will be simple</p> <p>For example:</p> $5\sqrt{3} + 2\sqrt{3} = 7\sqrt{3}$ $\sqrt{48} = 4\sqrt{3}$ $10 \times \frac{1}{\sqrt{5}} = 2\sqrt{5}$ <p>Recognitions of these sets</p> <p>Proofs of irrationality will not be required</p> <p>Carry out calculations using standard units of mass, length, area, volume and capacity, time</p> <p>Metric and SI units only</p> <p>Carry out calculations using money, including converting between currencies (where conversion is required, the rate of conversion will always be given)</p> <p>Students will be expected to interchange any of these methods of fractional representation and to select the most appropriate to given situations</p> <p>Ratios and proportions are required in, at most, three proportions, ie</p> $a:b \text{ or } a:b:c$ <p>Students will be expected to use the four operations with fractions and decimals, and use percentages, ratio and/or proportion in problems</p>

		<b>Notes</b>
	<p>Expressing numbers to a given degree of accuracy</p> <p>Numbers in standard form</p>	<p>Correction to a given number of decimal places or significant figures</p> <p><math>a \times 10^n</math>, where <math>n</math> is an integer and <math>1 \leq a &lt; 10</math></p> <p>Solve problems involving standard form</p> <p>Questions may involve the application of any of the techniques listed in (1) to problems of everyday personal, domestic or community life</p>



2	Sets	Notes
	<p>The idea of a set</p> <p>Set language and notation</p> <p>Union and intersection of sets</p> <p>Number of elements in a set</p> <p>Complementary sets</p> <p>Subsets</p> <p>Universal set, null set</p> <p>Venn diagrams and their use in simple logical problems</p> <p>Use of symbols to represent sets</p>	<p>Questions may be set involving these ideas in the abstract or derived from practical situations</p> <p>Understand sets defined in algebraic terms</p> <p>Use the notation <math>n(A)</math></p> <p>Use the notation <math>A'</math></p>

3	Algebra	Notes
	<p>The basic processes of algebra</p> <p>The construction, interpretation and use of formulae and their manipulation</p> <p>The factorisation of simple algebraic expressions</p> <p>Use of the factor theorem for integer values of the variable</p> <p>The manipulation of simple algebraic fractions, the denominators being numerical, linear or quadratic</p> <p>Solution of equations of 1<sup>st</sup> and 2<sup>nd</sup> degree containing one unknown quantity</p> <p>Solution of linear simultaneous equations in two unknowns</p> <p>Solution of linear inequalities, and the representations of solutions on the number line and two-dimensional space</p> <p>The idea of a sequence</p>	<p>Collecting like terms, using the four operations, the rules of indices, with integers and fractional powers</p> <p>To include change of subject of a formula and substitution</p> <p>Including application to cubics</p> <p>Simple cases involving sum, difference, product and quotient of algebraic fractions</p> <p>Solution of quadratics to include solution by factorisation, by graph, by completing the square or by formula</p> <p>Problems which result in the solution of such equations may also be set</p> <p>Simple questions may be set requiring the graphical solution of simultaneous linear equations</p> <p>Simple questions may be set requiring the graphical solution of simultaneous linear inequalities</p> <p>No questions will be set on linear programming</p> <p>Being able to recognise sequences with a common difference or common integer sequences, and to continue a given sequence</p>

4	Functions	Notes
	<p>The idea of a function of a variable</p> <p>Function as a mapping or as a correspondence between the elements of two sets</p> <p>Use functional notations of the form <math>f(x) = \dots</math> and <math>f: x \mapsto</math></p> <p>Domain and range of a function</p> <p>Composite functions</p> <p>Inverse functions</p> <p>Variation, direct and indirect proportion</p> <p>Rectangular cartesian coordinates</p> <p>Graphs and graphical treatment of the equation:</p> $y = Ax^3 + Bx^2 + Cx + D + \frac{E}{x} + \frac{F}{x^2}$ <p>in which the constants are numerical and at least three of them are zero</p> <p>The gradients of these graphs by drawing</p> <p>Differentiation of integer powers of <math>x</math></p> <p>Determination of gradients, rates of change, maxima and minima, stationary points</p>	<p>Questions will not be set on continuity, but students will be expected to recognise when parts of the domain need to be excluded (eg <math>x = 0</math> must be excluded from the domain of the function <math>f</math> where <math>f(x) = \frac{1}{x}</math>)</p> <p>‘fg’ will mean ‘do g first then f’</p> <p>Finding the inverse of a function</p> <p>To include the following cases:</p> $y \propto x; y \propto \frac{1}{x}; y \propto x^2; y \propto \frac{1}{x^2}; y \propto x^3;$ $y \propto \frac{1}{x^3}$ <p>Students will be expected to draw and interpret graphs from given equations</p> <p>Use of the intersection of two curves (graphs) to solve equations</p> <p>Students will be expected to draw a reasonable tangent to the graph at a named point and to construct an appropriate right-angled triangle from which to calculate the gradient</p> <p>Use of <math>\frac{dy}{dx}</math> notation</p> <p>Students will either be required to differentiate or use graphical methods to arrive at solutions and relate their calculations to their graphs and vice versa</p>

		<b>Notes</b>
	Applications to linear kinematics and to other simple practical problems	<p>This includes the drawing and interpretation of distance/time and speed/time graphs and other graphs of a similar nature</p> <p>Students need to be able to understand the relationship between displacement or distance, velocity and speed, and acceleration, for example:</p> $\frac{ds}{dt} = v \text{ and } \frac{dv}{dt} = a$

5	Matrices	Notes
	<p>Representation of data by a matrix</p> <p>Addition and multiplication of matrices</p> <p>Multiplication of a matrix by a scalar</p> <p>Unit (identity) matrix and zero (null) matrix</p> <p>Determinants and inverses of non-singular <math>2 \times 2</math> matrices</p> <p>Transformations of the plane associated with <math>2 \times 2</math> matrices</p> <p>Combination of transformations</p>	<p>An understanding of ideas of how to perform row and column multiplication, of order not more than <math>3 \times 3</math>, for these operations will be expected</p> <p>Of order not more than <math>3 \times 3</math></p> <p>Knowledge of singular matrices is not required</p> <p>Transformations include:</p> <p>Reflections in any line</p> <p>Rotations about any point</p> <p>Translations</p> <p>Enlargements</p> <p>If an invariant of a transformation is required algebraically, a lead will be given</p>

6	Geometry	Notes
	<p>Geometrical properties of Euclidean space, as listed below</p> <p>Angle properties of parallel lines, triangles and polygons, including regular polygons</p> <p>Properties of the parallelogram, rectangle, square, rhombus, trapezium and kite</p> <p>Symmetry about a point, line or plane</p> <p>Use of Pythagoras' theorem in 2D and 3D</p> <p>Similarity: areas and volumes of similar figures</p> <p>Congruent shapes</p> <p>Chord, angle and tangent properties of circles</p> <p>Loci in 2 dimensions</p> <p>Constructions of bisector of an angle and of perpendicular bisector (mediator) of a straight line</p>	<p>In solving any problem or rider, students may use any knowledge they possess.</p> <p>Solutions may be by traditional methods (eg congruent triangles), vectors, the use of transformations such as translation, reflection, rotation and enlargement, or a mixture of these.</p> <p>Formal proofs of theorems will not be required</p> <p>Angles on a straight line, angles round a point</p> <p>Angles measured anticlockwise will be taken as positive; clockwise as negative</p> <p>Recognise line and rotational symmetry</p> <p>Complete shapes with a given axis of symmetry and order of rotational symmetry</p> <p>Including its use in any acute angled triangle where an altitude is given or constructed.</p> <p>The angle bisector theorems are excluded</p> <p>Understanding how scale factors are related to area and volume</p> <p>To include knowledge of the intersecting chord properties (both internal and external) and the alternate segment theorem</p> <p>Any accurate method using normal geometrical instruments will be acceptable</p> <p>'Tracing paper' methods will not be acceptable</p> <p>Ruler and compass constructions only</p>

7	Mensuration	Notes
	<p>Length, area, volume</p> <p>Mensuration of two dimensional shapes, rectangle, parallelogram, trapezium, triangle, circle</p> <p>Mensuration of the three dimensional shapes, right circular cylinder, right circular cone and sphere, cuboid, pyramid, prism</p> <p>Length of an arc, area of a sector of a circle</p>	<p>Straightforward calculations, where appropriate, of areas of the shapes mentioned and also of two dimensional shapes which can be divided into a collection of such shapes (eg trapezia, polygons)</p> <p>Straightforward calculations, where appropriate, of volumes of the shapes mentioned and also of two dimensional shapes which can be divided into a collection of such shapes (eg trapezia, polygons)</p> <p>Radian measure is excluded</p>

8	Vectors	Notes
	<p>Scalar and vector quantities</p> <p>Understand and use vector notation</p> <p>Representation of a vector by a directed line segment</p> <p>Parallel vectors, unit vectors</p> <p>Sum and difference of two vectors</p> <p>Modulus (magnitude) of a vector</p> <p>Multiplication of a vector by a scalar</p> <p>Find the resultant of two or more vectors</p> <p>Apply vector methods to simple geometrical problems</p> <p>Multiplication of a vector by a matrix</p>	<p>Vectors will be in 2 dimensions only</p> <p>The notations <math>\vec{OA}</math> and <math>\mathbf{a}</math> will be used, as will column vectors</p> <p>The problems may involve colinearity, parallel lines and concurrency</p> <p>To include the finding of a matrix for a given transformation of the plane, using the unit base vectors. These transformations will be those for which the origin is unchanged</p>



9	Trigonometry	Notes
	<p>Use of sine, cosine and tangent of angles up to 180°</p> <p>Solution of problems in 2 and 3 dimensions by calculation and by drawing</p> <p>Angles of elevation and depression</p> <p>Bearings</p>	<p>Angles will be measured in degrees and decimals of a degree</p> <p>Use of the sine and cosine rule</p> <p>Area of a triangle = <math>\frac{1}{2} bcsinA</math></p> <p>Questions on latitude and longitude will not be set</p> <p>Calculations of the angle between two planes, or of the angle between a straight line and a plane will not be set</p> <p>Angles will be given in degrees and decimals of a degree; the normal convention of bearings being measured clockwise will be adopted</p>

10	Statistics and probability	Notes
	<p>Graphical representation of numerical data</p> <p>Determination of the mean, median and mode for a discrete data set</p> <p>Calculation of an estimate of the mean of a larger number of quantities given in grouped frequencies</p> <p>Determination of a modal class and the median for grouped data</p> <p>Understand the language and basic concepts of probability</p> <p>Use of addition rule for two or more mutually exclusive events</p> <p>Use of product rule for two or more independent events</p> <p>Determination of the probability of two or more independent events</p> <p>Using simple conditional probability for combined events</p> <p>Using very simple conditional probability</p>	<p>To include bar diagrams, circular diagrams (pie charts) and histograms</p> <p>Cumulative frequency graphs are excluded</p> <p>Questions involving weighted or moving means will not be set</p> <p>To include the probability scale, sample spaces, relative frequency, probabilities and complements</p> <p>Knowing that when <math>A</math> and <math>B</math> are mutually exclusive events,  <math>P(A \text{ or } B) = P(A) + P(B)</math></p> <p>Knowing that when <math>A</math> and <math>B</math> are independent events,  <math>P(A \text{ and } B) = P(A) \times P(B)</math></p> <p>The use of tree diagrams will be expected</p>

# Assessment

## Assessment summary

Papers 1 and 2 are externally assessed examination papers.

<b>Paper 1</b>	<b>Paper code: 4MB0/01</b>
<ul style="list-style-type: none"><li>• 1 hour and 30 minutes long</li><li>• 100 marks</li><li>• Calculator allowed</li><li>• About 26 to 30 questions</li></ul>	
<b>Paper 2</b>	<b>Paper code: 4MB0/02</b>
<ul style="list-style-type: none"><li>• 2 hours and 30 minutes long</li><li>• 100 marks</li><li>• Calculator allowed</li><li>• Formulae provided</li><li>• About 12 questions</li></ul>	

## Assessment Objectives and weightings

	<b>% in IGCSE</b>
AO1: demonstrate knowledge, understanding and skills in number and algebra: <ul style="list-style-type: none"><li>• numbers and the numbering system</li><li>• calculations</li><li>• solving numerical problems</li><li>• equations, formulae and expressions</li><li>• sequences, functions and graphs</li><li>• matrices</li></ul>	<b>60%</b>
AO2: demonstrate knowledge, understanding and skills in shape, space and measures: <ul style="list-style-type: none"><li>• geometry</li><li>• vectors and transformation geometry</li><li>• trigonometry</li></ul>	<b>30%</b>
AO3: demonstrate knowledge, understanding and skills in handling data: <ul style="list-style-type: none"><li>• statistics</li><li>• probability</li></ul>	<b>10%</b>
<b>TOTAL</b>	<b>100%</b>

## Relationship of Assessment Objectives to papers for IGCSE

Paper number	Assessment Objective			Total for AO1, AO2 and AO3
	AO1	AO2	AO3	
Paper 1	20%	10%	$3\frac{1}{3}\%$	$33\frac{1}{3}\%$
Paper 2	40%	20%	$6\frac{2}{3}\%$	$66\frac{2}{3}\%$
Total for IGCSE	60%	30%	10%	100%

## Entering your students for assessment

### Student entry

Details of how to enter students for this qualification can be found in Edexcel's *International Information Manual*, copies of which (in CD format) are sent to all active Edexcel centres. The information can also be found on Edexcel's international website:  
[www.edexcel-international.org/sfc/academic/infomanual](http://www.edexcel-international.org/sfc/academic/infomanual)

### Combinations of entry

There are no forbidden combinations.

### Access arrangements and special requirements

Edexcel's policy on access arrangements and special considerations for GCE, GCSE, IGCSE, 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.

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

- the *Joint Council for Qualifications (JCQ) policy Access Arrangements and Special Considerations, Regulations and Guidance Relating to Students who are Eligible for Adjustments in Examinations*
- 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 Paper 1 and Paper 2 of this qualification will take place in the June 2011 series and in each following January and June series for the lifetime of the specification.

### Your student assessment opportunities

Paper	June 2011	January 2012	June 2012	January 2013
Paper 1 and Paper 2	✓	✓	✓	✓

## Awarding and reporting

The grading, awarding and certification of this qualification will follow the processes outlined in the current GCSE/GCE Code of Practice for courses starting in September 2009, which is published by the Qualifications and Curriculum Authority (QCA). The IGCSE qualification will be graded and certificated on a six-grade scale from A\* to E.

Students whose level of achievement is below the minimum standard for Grade E will receive an unclassified U. Where unclassified is received it will not be recorded on the certificate.

The first certification opportunity for the Edexcel IGCSE in Mathematics (Specification B) will be June 2011.

## Language of assessment

Assessment of this specification 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 Joint Council for Qualifications *Suspected Malpractice in Examinations: Policies and Procedures* document on the JCQ website [www.jcq.org.uk](http://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.

## Progression

This qualification supports progression to:

- IGCSE in Further Pure Mathematics
- GCE AS and A Level in Mathematics
- GCE AS and A Level in Further Mathematics
- GCE AS and A Level in Pure Mathematics
- GCEs and other Level 3 qualifications in numerate disciplines, such as the sciences, economics and business
- further training or employment where numerate skills and knowledge are required.

## Grade descriptions

The following grade descriptions indicate the level of attainment characteristic of the given grade at IGCSE. They give a general indication of the required learning outcomes at each specified grade. The descriptions should be interpreted in relation to the content outlined in the specification; they are not designed to define that content. The grade 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 performances in others.

### Grade A

In addition to the requirements for Grade C, candidates can:

- demonstrate that they have a good understanding and ability to perform numerical calculations. They can apply fractional indices and indices expressed in algebraic terms to problems
- apply mensuration to complex problems involving polygons, circles and three dimensional shapes which may involve algebraic manipulation
- solve complex literal problems involving Venn diagrams
- construct and apply an algebraic formula to solve a problem in a literal context
- successfully change the subject in a complex formula
- use the factor theorem effectively
- apply the solution of quadratic and simultaneous equations to literal problems
- solve complex problems using intersections and gradients of graphs
- correctly identify the domain and range for suitable functions and manipulate composite functions effectively
- differentiate using integer powers of  $x$  and can use the process of differentiation to determine rates of change, maxima and minima
- apply differentiation to linear kinematics and other simple problems
- manipulate matrices in complex problems
- effectively manipulate vectors when applied to complex problems

- apply geometrical properties and theorems to complex problems and can give reasons for their conclusions
- successfully apply trigonometrical rules in complex problems in either 2 or 3 dimensions
- interpret and construct histograms
- recognise when and how to work with probabilities associated with independent and mutually exclusive events
- understand the concept of conditional probability where the outcome of the second event is dependent on the outcome of the first event.

### **Grade C**

Candidates can:

- apply the four operations of arithmetic
- use fractions and decimals, calculate ratios and percentages
- express numbers to a given degree of accuracy and understand Standard Form
- identify HCF and LCM in simple cases
- manipulate indices where the index is a positive integer value
- apply numerical techniques to everyday problems
- understand and use the equivalences between fractions, decimals and percentages and calculate using ratios in appropriate situations
- represent inequalities using a number line
- calculate lengths, areas and volumes of the shapes stated in the specification content
- understand and apply the notation of union, intersection, complement and number of elements of a set and apply this notation to simple Venn diagrams
- demonstrate that they are competent with algebraic manipulation
- construct and apply a simple algebraic formula to solve a simple problem
- change the subject of a formula in a simple case
- factorise simple algebraic expressions
- solve two linear simultaneous equations, either by algebraic or graphical methods
- solve quadratic equations, either by factorisation or by use of the formula
- handle simple linear inequalities and understand and use simple sequences
- understand the concept of a function of a variable
- find the inverse of a function
- draw a graph of a function from table data
- solve simple problems involving variation
- find the gradient of graph by drawing a suitable tangent
- understand and use compound measures such as speed
- understand and effectively manipulate vectors and matrices
- understand simple transformations associated with  $2 \times 2$  matrices
- understand and use angle properties of parallel lines, triangles and polygons

- understand and use the geometrical properties of the circle
- apply the concept of similarity to simple problems
- understand and apply Pythagoras' theorem and basic trigonometry in 2 dimensions
- apply and calculate angles of elevation and depression in simple problems
- represent data graphically by using bar and pie charts
- calculate the mean of a small number of quantities or calculate an estimate of the mean of grouped data
- calculate simple probabilities and construct simple tree diagrams.



# 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](http://www.edexcel.com/resultsplus).

**Ask the Expert** – Ask the Expert is a new service, launched in 2007, that provides direct email access to senior subject specialists who will be able to answer any questions you might have about this or any other specification. All of our specialists are senior examiners, moderators or verifiers and they will answer your email personally. You can read a biography for all of them and learn more about this unique service on our website at [www.edexcel.com/asktheexpert](http://www.edexcel.com/asktheexpert).

**Ask Edexcel** – Ask Edexcel is Edexcel’s online question and answer service. You can access it at [www.edexcel.com/ask](http://www.edexcel.com/ask) or by going to the main website and selecting the Ask Edexcel menu item on the left.

The service allows you to search through a database of thousands of questions and answers on everything Edexcel offers. If you don’t find an answer to your question, you can choose to submit it straight to us. One of our customer services team will log your query, find an answer and send it to you. They’ll also consider adding it to the database if appropriate. This way the volume of helpful information that can be accessed via the service is growing all the time.

**Examzone** – The Examzone site is aimed at students sitting external examinations and gives information on revision, advice from examiners and guidance on results, including re-marking, re-sitting 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](http://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](http://www.edexcel.com)

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For more information on Edexcel and BTEC qualifications  
please visit our website: [www.edexcel.com](http://www.edexcel.com)

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