Syllabus

Cambridge IGCSE International Mathematics
Syllabus code 0607
For examination in June and November 2013

UNIVERSITY of CAMBRIDGE
International Examinations

Contents

Cambridge IGCSE International Mathematics
Syllabus code 0607

1. Introduction

1.1 Why choose Cambridge?

University of Cambridge International Examinations (CIE) is the world's largest provider of international qualifications. Around 1.5 million students from 150 countries enter Cambridge examinations every year. What makes educators around the world choose Cambridge?

Recognition

Cambridge IGCSE is internationally recognised by schools, universities and employers as equivalent to UK GCSE. Cambridge IGCSE is excellent preparation for A/AS Level, the Advanced International Certificate of Education (AICE), US Advanced Placement Programme and the International Baccalaureate (IB) Diploma. Learn more at **www.cie.org.uk/recognition**.

Support

CIE provides a world-class support service for teachers and exams officers. We offer a wide range of teacher materials to Centres, plus teacher training (online and face-to-face) and student support materials. Exams officers can trust in reliable, efficient administration of exams entry and excellent, personal support from CIE Customer Services. Learn more at **www.cie.org.uk/teachers**.

Excellence in education

Cambridge qualifications develop successful students. They build not only understanding and knowledge required for progression, but also learning and thinking skills that help students become independent learners and equip them for life.

Not-for-profit, part of the University of Cambridge

CIE is part of Cambridge Assessment, a not-for-profit organisation and part of the University of Cambridge. The needs of teachers and learners are at the core of what we do. CIE invests constantly in improving its qualifications and services. We draw upon education research in developing our qualifications.

1. Introduction

1.2 Why choose Cambridge IGCSE International Mathematics?

Mathematics teachers in international schools have worked with CIE to create Cambridge International Mathematics (IGCSE) – a new curriculum and qualification to prepare students to use the power of mathematics in an increasingly technological world. The new syllabus fits teaching maths in an international school, leading to a qualification with widespread university recognition.

1.3 Cambridge International Certificate of Education (ICE)

Cambridge ICE is the group award of the International General Certificate of Secondary Education (IGCSE). It requires the study of subjects drawn from the five different IGCSE subject groups. It gives schools the opportunity to benefit from offering a broad and balanced curriculum by recognising the achievements of students who pass examinations in at least seven subjects, including two languages, and one subject from each of the other subject groups.

The Cambridge portfolio of IGCSE qualifications provides a solid foundation for higher level courses such as GCE A and AS Levels and the International Baccalaureate Diploma as well as excellent preparation for employment.

A wide range of IGCSE subjects is available and these are grouped into five curriculum areas. Cambridge International Mathematics (0607) falls in Group IV, Mathematics.
Learn more about ICE at **www.cie.org.uk/qualifications/academic/middlesec/ice.**

1.4 How can I find out more?

If you are already a Cambridge Centre

You can make entries for this qualification through your usual channels, e.g. CIE Direct. If you have any queries, please contact us at **international@cie.org.uk**.

If you are not a Cambridge Centre

You can find out how your organisation can become a Cambridge Centre. Email us at **international@cie.org.uk**. Learn more about the benefits of becoming a Cambridge Centre at **www.cie.org.uk**.

2. Assessment at a glance

Cambridge IGCSE International Mathematics Syllabus code 0607

Candidates may follow either the Core Curriculum only or the Extended Curriculum. Candidates should attempt to answer all questions on each paper.

Core curriculum	Extended curriculum
Paper 1 **45 minutes** 10–12 short response questions. No calculators are permitted. Designed to assess knowledge and use of basic skills and methods. Any part of the syllabus content may be present in this paper but questions will focus on concepts which can be assessed without access to a calculator. **40 marks: 25% of assessment**	**Paper 2** **45 minutes** 10–12 short response questions. No calculators are permitted. Designed to assess knowledge and use of basic skills and methods. Any part of the syllabus content may be present in this paper but questions will focus on concepts which can be assessed without access to a calculator. **40 marks: 20% of assessment**
Paper 3 **1 hour 45 minutes** 11–15 medium to extended response questions. A graphics calculator is required. Any area of the syllabus may be assessed. Some of the questions will particularly assess the use of the graphics calculator functions described on Page 7. **96 marks: 60% of assessment**	**Paper 4** **2 hours 15 minutes**. 11–15 medium to extended response questions. A graphics calculator is required. Any area of the syllabus may be assessed. Some of the questions will particularly assess the use of the graphics calculator functions described on Page 7. **120 marks: 60% of assessment**
Paper 5 **1 hour** One investigation question. A graphics calculator is required. Any area of the syllabus may be assessed. Candidates are assessed on their ability to investigate and solve a more open-ended problem. Clear communication and full reasoning are especially important and mark schemes reflect this. An extended time allowance is given for this paper to allow students to explore and communicate their ideas fully. **24 marks: 15% of assessment**	**Paper 6** **1 hour 30 minutes** One investigation and one modelling question. A graphics calculator is required. Any area of the syllabus may be assessed. Candidates are assessed on their ability to investigate, model, and solve more open-ended problems. Clear communication and full reasoning are especially important and mark schemes reflect this. An extended time allowance is given for this paper to allow students to explore and communicate their ideas fully. **40 marks: 20% of assessment**

2. Assessment at a glance

2.1 Formula lists

Some mathematical formulae will be provided at the start of Papers 1–4.
These Core and Extended formula lists are given in the Appendix of this booklet.

Availability

This syllabus is examined in the May/June examination session and the October/November examination session.

This syllabus is available to private candidates.

Centres in the UK that receive government funding are advised to consult the CIE website **www.cie.org.uk** for the latest information before beginning to teach this syllabus.

Combining this with other syllabuses

Candidates can combine this syllabus in an examination session with any other CIE syllabus, except:

- syllabuses with the same title (or the title Mathematics) at the same level

Please note that IGCSE, Cambridge International Level 1/Level 2 Certificates and O Level syllabuses are at the same level.

3. Syllabus aims and objectives

3.1 Aims

Cambridge International Mathematics (IGCSE) syllabus is designed as a two-year course for examination at age 16-plus. The aims of this syllabus should enable students to:

1. acquire a foundation of mathematical skills appropriate to further study and continued learning in mathematics;
2. develop a foundation of mathematical skills and apply them to other subjects and to the real world;
3. develop methods of problem solving;
4. interpret mathematical results and understand their significance;
5. develop patience and persistence in solving problems;
6. develop a positive attitude towards mathematics which encourages enjoyment, fosters confidence and promotes enquiry and further learning;
7. appreciate the beauty and power of mathematics;
8. appreciate the difference between mathematical proof and pattern spotting;
9. appreciate the interdependence of different branches of mathematics and the links with other disciplines;
10. appreciate the international aspect of mathematics, its cultural and historical significance and its role in the real world;
11. read mathematics and communicate the subject in a variety of ways.

3.2 Assessment objectives

The examination will test the ability of candidates to:

1. know and apply concepts from all the aspects of mathematics listed in the specification;
2. apply combinations of mathematical skills and techniques to solve a problem;
3. solve a problem by investigation, analysis, the use of deductive skills and the application of an appropriate strategy;
4. recognise patterns and structures and so form generalisations;
5. draw logical conclusions from information and understand the significance of mathematical or statistical results;
6. use spatial relationships in solving problems;
7. use the concepts of mathematical modelling to describe a real-life situation and draw conclusions;
8. organise, interpret and present information in written, tabular, graphical and diagrammatic forms;
9. use statistical techniques to explore relationships in the real world;

10. communicate mathematical work using the correct mathematical notation and terminology, logical argument, diagrams and graphs;
11. make effective use of technology;
12. estimate and work to appropriate degrees of accuracy.

3.3 Graphics calculator requirements

Candidates should be able to do the following using a graphics calculator.

- Sketch a graph.
- Produce a table of values for a function.
- Find zeros and local maxima or minima of a function.
- Find the intersection point of two graphs.
- Find mean, median, quartiles.
- Find the linear regression equation.

Other existing in-built applications should not be used and will gain no credit.
Calculators with symbolic algebraic logic are not permitted.
Any other applications and programs from external sources are not permitted.

3.4 Problem-solving requirements

Candidates should be able to:

- select the mathematics and information to model a situation;
- select the appropriate tools, including ICT, to use in a situation;
- apply appropriate methods and techniques to analyse a situation;
- interpret and communicate the results of the analysis.

4. Curriculum content

Candidates may follow either the Core Curriculum or the Extended Curriculum.

1	Number – Core curriculum	Notes	Link within syllabus
1.1	Vocabulary and notation for different sets of numbers: natural numbers $\mathbb{N}$, primes, squares, cubes, integers $\mathbb{Z}$, rational numbers $\mathbb{Q}$, irrational numbers, real numbers $\mathbb{R}$, triangle numbers	$\mathbb{N} = \{0, 1, 2, \ldots\}$	
1.2	Use of the four operations and brackets		
1.3	Highest common factor, lowest common multiple		
1.4	Calculation of powers and roots		
1.5	Ratio and proportion	including use of e.g. map scales	4.5
1.6			
1.7	Equivalences between decimals, fractions, ratios and percentages		
1.8	Percentages including applications such as interest and profit	excluding reverse percentages includes both simple and compound interest	
1.9	Meaning of exponents (powers, indices) in $\mathbb{Z}$ Standard Form $a \times 10^n$ where $1 \leq a < 10$ and $n \in \mathbb{Z}$ Rules for exponents		
1.10			
1.11	Estimating, rounding, decimal places and significant figures		
1.12	Calculations involving time: second (s), minutes (min), hours (h), days, months, years including the relation between consecutive units	1 year = 365 days	
1.13	Problems involving speed, distance and time problems		

4. Curriculum content

1	Number – Extended curriculum	Notes	Link within syllabus
1.1	Vocabulary and notation for different sets of numbers: natural numbers $\mathbb{N}$, primes, squares, cubes, integers $\mathbb{Z}$, rational numbers $\mathbb{Q}$, irrational numbers, real numbers $\mathbb{R}$, triangle numbers	$\mathbb{N} = \{0, 1, 2, \ldots\}$	
1.2	Use of the four operations and brackets		
1.3	Highest common factor, lowest common multiple		
1.4	Calculation of powers and roots		
1.5	Ratio and proportion	including use of e.g. map scales	4.5
1.6	Absolute value $\lvert x \rvert$		
1.7	Equivalences between decimals, fractions, ratios and percentages		
1.8	Percentages including applications such as interest and profit	includes both simple and compound interest includes percentiles	3.2 11.7
1.9	Meaning of exponents (powers, indices) in $\mathbb{Q}$ Standard Form $a \times 10^n$ where $1 \leq a < 10$ and $n \in \mathbb{Z}$ Rules for exponents		
1.10	Surds (radicals), simplification of square root expressions Rationalisation of the denominator	e.g. $\frac{1}{\sqrt{3}-1}$	
1.11	Estimating, rounding, decimal places and significant figures		
1.12	Calculations involving time: second (s), minutes (min), hours (h), days, months, years including the relation between consecutive units	1 year = 365 days	
1.13	Problems involving speed, distance and time problems		

4. Curriculum content

2	Algebra – Core curriculum	Notes	Link within syllabus
2.1	Writing, showing and interpretation of inequalities, including those on the real number line		9.2
2.2	Solution of simple linear inequalities		
2.3	Solution of linear equations		
2.4	Simple indices – multiplying and dividing	e.g. $8x^5 \div 2x^3$	
2.5	Derivation, rearrangement and evaluation of simple formulae		
2.6	Solution of simultaneous linear equations in two variables		
2.7	Expansion of brackets	including e.g. $(x - 5)(2x + 1)$	
2.8	Factorisation: common factor only	e.g. $6x^2 + 9x = 3x(2x + 3)$	
2.9	Algebraic fractions: simplification addition or subtraction of fractions with integer denominators multiplication or division of two simple fractions	e.g. $\frac{2x^2}{6x}$ e.g. $\frac{2x}{3} - \frac{y}{5}$ e.g. $\frac{p}{q} \div \frac{2t}{3q}$	
2.10			
2.11	Use of a graphics calculator to solve equations, including those which may be unfamiliar	e.g. $2^x = x^2$	3.6
2.12	Continuation of a sequence of numbers or patterns Determination of the *n*th term Use of a difference method to find the formula for a linear sequence or a simple quadratic sequence		
2.13			

4. Curriculum content

2	Algebra – Extended curriculum	Notes	Link within syllabus
2.1	Writing, showing and interpretation of inequalities, including those on the real number line		9.2
2.2	Solution of linear and quadratic inequalities Solution of inequalities using a graphics calculator	e.g. $2x^2 + 5x - 3 < 0$	
2.3	Solution of linear equations including those with fractional expressions		
2.4	Indices		
2.5	Derivation, rearrangement and evaluation of formulae		
2.6	Solution of simultaneous linear equations in two variables		
2.7	Expansion of brackets, including the square of a binomial		
2.8	Factorisation: common factor difference of squares trinomial four term	e.g. $6x^2 + 9x = 3x(2x + 3)$ e.g. $9x^2 - 16y^2 = (3x - 4y)(3x + 4y)$ e.g. $6x^2 + 11x - 10 = (3x - 2)(2x + 5)$ e.g. $xy - 3x + 2y - 6 = (x + 2)(y - 3)$	
2.9	Algebraic fractions: simplification, including use of factorisation addition or subtraction of fractions with linear denominators multiplication or division and simplification of two fractions		
2.10	Solution of quadratic equations: by factorisation using a graphics calculator using the quadratic formula	 formula given	3.6
2.11	Use of a graphics calculator to solve equations, including those which may be unfamiliar	e.g. $2^x - 1 = 1/x^3$	3.6
2.12	Continuation of a sequence of numbers or patterns Determination of the nth term Use of a difference method to find the formula for a linear sequence, a quadratic sequence or a cubic sequence Identification of a simple geometric sequence and determination of its formula		
2.13	Direct variation (proportion) $y \propto x$, $y \propto x^2$, $y \propto x^3$, $y \propto \sqrt{x}$ Inverse variation $y \propto 1/x$, $y \propto 1/x^2$, $y \propto 1/\sqrt{x}$ Best variation model for given data		modelling

4. Curriculum content

3	Functions – Core curriculum	Notes	Link within syllabus
3.1	Notation Domain and range Mapping diagrams	 domain is $\mathbb{R}$ unless stated otherwise	
3.2			
3.3			
3.4			
3.5	Understanding of the concept of asymptotes and graphical identification of simple examples parallel to the axes		
3.6	Use of a graphics calculator to: sketch the graph of a function produce a table of values find zeros, local maxima or minima find the intersection of the graphs of functions	 including unfamiliar functions not mentioned explicitly in this syllabus vertex of quadratic	2.11
3.7			
3.8	Description and identification, using the language of transformations, of the changes to the graph of $y = f(x)$ when $y = f(x) + k$, $y = f(x + k)$	 k an integer	5.4
3.9			
3.10			

4. Curriculum content

3	Functions – Extended curriculum	Notes	Link within syllabus
3.1	Notation Domain and range Mapping diagrams	 domain is $\mathbb{R}$ unless stated otherwise	
3.2	Recognition of the following function types from the shape of their graphs: linear $f(x) = ax + b$ quadratic $f(x) = ax^2 + bx + c$ cubic $f(x) = ax^3 + bx^2 + cx + d$ reciprocal $f(x) = a/x$ exponential $f(x) = a^x$ with $0 < a < 1$ or $a > 1$ absolute value $f(x) = \lvert ax + b \rvert$ trigonometric $f(x) = a\sin(bx)$; $a\cos(bx)$; $\tan x$	some of a, b, c or d may be 0 compound interest including period and amplitude	modelling 7.6 7.8 1.8 8.8
3.3	Determination of at most two of a, b, c or d in simple cases of 3.2		modelling
3.4	Finding the quadratic function given vertex and another point, x-intercepts and a point, vertex or x-intercepts with $a = 1$.	 $y = a(x - h)^2 + k$ has a vertex of (h, k)	
3.5	Understanding of the concept of asymptotes and graphical identification of examples	e.g. $f(x) = \tan x$ asymptotes at 90°, 270° etc. excludes algebraic derivation of asymptotes includes oblique asymptotes	
3.6	Use of a graphics calculator to: sketch the graph of a function produce a table of values find zeros, local maxima or minima find the intersection of the graphs of functions	 including unfamiliar functions not mentioned explicitly in this syllabus vertex of quadratic	 2.11 2.10
3.7	Simplify expressions such as $f(g(x))$ where $g(x)$ is a linear expression		
3.8	Description and identification, using the language of transformations, of the changes to the graph of $y = f(x)$ when $y = f(x) + k$, $y = k\,f(x)$, $y = f(x + k)$	 k an integer	5.4
3.9	Inverse function f^{-1}		5.5
3.10	Logarithmic function as the inverse of the exponential function $y = a^x$ equivalent to $x = \log_a y$ Rules for logarithms corresponding to rules for exponents Solution to $a^x = b$ as $x = \log b / \log a$.		

4. Curriculum content

4	Geometry – Core curriculum	Notes	Link within syllabus
4.1	Use and interpret the geometrical terms: acute, obtuse, right angle, reflex, parallel, perpendicular, congruent, similar Use and interpret vocabulary of triangles, quadrilaterals, polygons and simple solid figures		
4.2	Line and rotational symmetry		7.8
4.3	Angle measurement in degrees		
4.4	Angles round a point Angles on a straight line and intersecting straight lines Vertically opposite angles Alternate and corresponding angles on parallel lines Angle sum of a triangle, quadrilateral and polygons Interior and exterior angles of a polygon Angles of regular polygons		
4.5	Similarity Calculation of lengths of similar figures		1.5
4.6	Pythagoras' Theorem in two dimensions Including: chord length distance of a chord from the centre of a circle distances on a grid		7.2
4.7	Use and interpret vocabulary of circles Properties of circles tangent perpendicular to radius at the point of contact tangents from a point angle in a semicircle	includes sector and segment	

4. Curriculum content

4	Geometry – Extended curriculum	Notes	Link within syllabus
4.1	Use and interpret the geometrical terms: acute, obtuse, right angle, reflex, parallel, perpendicular, congruent, similar Use and interpret vocabulary of triangles, quadrilaterals, polygons and simple solid figures		
4.2	Line and rotational symmetry		7.8
4.3	Angle measurement in degrees		
4.4	Angles round a point Angles on a straight line and intersecting straight lines Vertically opposite angles Alternate and corresponding angles on parallel lines Angle sum of a triangle, quadrilateral and polygons Interior and exterior angles of a polygon Angles of regular polygons		
4.5	Similarity Calculation of lengths of similar figures Use of area and volume scale factors		1.5
4.6	Pythagoras' Theorem and its converse in two and three dimensions Including: chord length distance of a chord from the centre of a circle distances on a grid		5.3 7.2
4.7	Use and interpret vocabulary of circles Properties of circles: tangent perpendicular to radius at the point of contact tangents from a point angle in a semicircle angles at the centre and at the circumference on the same arc cyclic quadrilateral	includes sector and segment	

4. Curriculum content

5	Transformations in two dimensions – Core Curriculum	Notes	Link within syllabus
5.1	Notation: Directed line segment $\overrightarrow{AB}$; component form $\begin{pmatrix} x \\ y \end{pmatrix}$		
5.2			
5.3			
5.4	Transformations on the Cartesian plane: translation, reflection, rotation, enlargement (reduction) Description of a translation using the notation in 5.1		3.8
5.5			
5.6			
6	**Mensuration – Core curriculum**	**Notes**	**Link within syllabus**
6.1	Units: mm, cm, m, km mm^2, cm^2, m^2, ha, km^2 mm^3, cm^3, m^3 ml, cl, l, g, kg, t	convert between units	
6.2	Perimeter and area of rectangle, triangle and compound shapes derived from these.	formula given for area of triangle	4.1
6.3	Circumference and area of a circle Arc length and area of sector	formulae given for circumference and area of a circle	
6.4	Surface area and volume of prism and pyramid (in particular, cuboid, cylinder and cone) Surface area and volume of sphere and hemisphere	formulae given for curved surface areas of cylinder, cone and sphere; volume of pyramid, cone, cylinder, prism and sphere	
6.5	Areas and volumes of compound shapes	simple cases only	

4. Curriculum content

5	Transformations and vectors in two dimensions – Extended curriculum	Notes	Link within syllabus
5.1	Notation: Vector **a**; directed line segment $\overrightarrow{AB}$; component form $\begin{pmatrix} x \\ y \end{pmatrix}$		
5.2	Addition and subtraction of vectors Negative of a vector Multiplication of a vector by a scalar		
5.3	Magnitude $\lvert \mathbf{a} \rvert$		4.6 7.2
5.4	Transformations on the Cartesian plane: translation, reflection, rotation, enlargement (reduction), stretch Description of a translation using the notation in 5.1		3.8
5.5	Inverse of a transformation		3.9
5.6	Combined transformations		
6	**Mensuration – Extended curriculum**	**Notes**	**Link within syllabus**
6.1	Units: mm, cm, m, km mm^2, cm^2, m^2, ha, km^2 mm^3, cm^3, m^3 ml, cl, l, g, kg, t	convert between units	
6.2	Perimeter and area of rectangle, triangle and compound shapes derived from these		4.1
6.3	Circumference and area of a circle Arc length and area of sector		
6.4	Surface area and volume of prism and pyramid (in particular, cuboid, cylinder and cone) Surface area and volume of sphere and hemisphere	formulae given for curved surface areas of cylinder, cone and sphere; volume of pyramid, cone, cylinder, and sphere	
6.5	Areas and volumes of compound shapes		

4. Curriculum content

7	Co-ordinate geometry – Core curriculum	Notes	Link within syllabus
7.1	Plotting of points and reading from a graph in the Cartesian plane		11.1
7.2	Distance between two points		4.6
7.3	Midpoint of a line segment		
7.4	Gradient of a line segment		
7.5	Gradient of parallel lines		
7.6	Equation of a straight line as $y = mx + c$ or $x = k$		
7.7			
7.8	Symmetry of diagrams or graphs in the Cartesian plane		4.2
8	**Trigonometry – Core curriculum**	**Notes**	**Link within syllabus**
8.1	Right-angled triangle trigonometry		
8.2			
8.3			
8.4			
8.5			
8.6			
8.7	Applications: three-figure bearings and North, East, South, West problems in two dimensions		
8.8			
9	**Sets – Core curriculum**	**Notes**	**Link within syllabus**
9.1	Notation and meaning for: is an element of ($\in$); is not an element of ($\notin$); is a subset of ($\subseteq$); is a proper subset of ($\subset$); universal set U, empty set $\varnothing$ or { }; complement of A, (A'); number of elements in A, n(A).		
9.2	Sets in descriptive form { x | } or as a list		2.1
9.3	Venn diagrams with at most two sets		
9.4	Intersection and union of sets		10.6

4. Curriculum content

7	Co-ordinate geometry – Extended curriculum	Notes	Link within syllabus
7.1	Plotting of points and reading from a graph in the Cartesian plane		11.1
7.2	Distance between two points		4.6 5.3
7.3	Midpoint of a line segment		
7.4	Gradient of a line segment		
7.5	Gradient of parallel and perpendicular lines		
7.6	Equation of a straight line as $y = mx + c$ and $ax + by = d$ (a, b and d integer)		3.2
7.7	Linear inequalities on the Cartesian plane	shade unwanted regions	
7.8	Symmetry of diagrams or graphs in the Cartesian plane		3.2 4.2
8	**Trigonometry – Extended curriculum**	**Notes**	**Link within syllabus**
8.1	Right-angled triangle trigonometry		
8.2	Exact values for the trigonometric ratios of 0°, 30°, 45°, 60°, 90°		
8.3	Extension to the four quadrants i.e. 0°–360°		
8.4	Sine Rule	formula given, ASA SSA (ambiguous case)	
8.5	Cosine Rule	formula given, SAS, SSS	
8.6	Area of triangle	formula given	
8.7	Applications: three-figure bearings and North, East, South, West problems in two and three dimensions		
8.8	Properties of the graphs of $y = \sin x$, $y = \cos x$, $y = \tan x$	x in degrees	3.2 3.8
9	**Sets – Extended curriculum**	**Notes**	**Link within syllabus**
9.1	Notation and meaning for: is an element of ($\in$); is not an element of ($\notin$); is a subset of ($\subseteq$); is a proper subset of ($\subset$); universal set U, empty set $\varnothing$ or { }; complement of A, (A'); number of elements in A, n(A)		
9.2	Sets in descriptive form { x | } or as a list		2.1
9.3	Venn diagrams with at most three sets		
9.4	Intersection and union of sets		10.6

10	Probability – Core curriculum	Notes	Link within syllabus
10.1	Probability P(*A*) as a fraction, decimal or percentage Significance of its value		
10.2	Relative frequency as an estimate of probability		
10.3	Expected frequency of occurrences		
10.4	Combining events	simple cases only	
10.5	Tree diagrams including successive selection with or without replacement	simple cases only	
10.6	Probabilities from Venn diagrams and tables		9.3
11	**Statistics – Core curriculum**	**Notes**	**Link within syllabus**
11.1	Reading and interpretation of graphs or tables of data		7.1
11.2	Discrete and continuous data		
11.3	(Compound) bar chart, line graph, pie chart, stem and leaf diagram, scatter diagram		
11.4	Mean, mode, median, quartiles and range from lists of discrete data Mean, mode, median and range from grouped discrete data		
11.5	Mean from continuous data		
11.6			
11.7	Cumulative frequency table and curve Median, quartiles and inter-quartile range	read from curve	
11.8	Use of a graphics calculator to calculate mean, median and quartiles for discrete data and mean for grouped data		
11.9	Understanding and description of correlation (positive, negative or zero) with reference to a scatter diagram Straight line of best fit (by eye) through the mean on a scatter diagram	the coefficient of correlation is not required	

4. Curriculum content

10	Probability – Extended curriculum	Notes	Link within syllabus
10.1	Probability P(A) as a fraction, decimal or percentage Significance of its value		
10.2	Relative frequency as an estimate of probability		
10.3	Expected frequency of occurrences		
10.4	Combining events: the addition rule P(A or B) = P(A) + P(B) the multiplication rule P(A and B) = P(A) × P(B)	mutually exclusive independent	
10.5	Tree diagrams including successive selection with or without replacement		
10.6	Probabilities from Venn diagrams and tables		9.3
11	**Statistics – Extended curriculum**	**Notes**	**Link within syllabus**
11.1	Reading and interpretation of graphs or tables of data		7.1
11.2	Discrete and continuous data		
11.3	(Compound) bar chart, line graph, pie chart, stem and leaf diagram, scatter diagram		
11.4	Mean, mode, median, quartiles and range from lists of discrete data Mean, mode, median and range from grouped discrete data		
11.5	Mean from continuous data		
11.6	Histograms with frequency density on the vertical axis using continuous data	includes histograms with unequal class intervals	
11.7	Cumulative frequency table and curve Median, quartiles, percentiles and inter-quartile range	read from curve	1.8
11.8	Use of a graphics calculator to calculate mean, median, and quartiles for discrete data and mean for grouped data		
11.9	Understanding and description of correlation (positive, negative or zero) with reference to a scatter diagram Straight line of best fit (by eye) through the mean on a scatter diagram Use a graphics calculator to find equation of linear regression	the coefficient of correlation is not required	

5. Appendix

List of formulae provided on Core Papers 1 and 3

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle, radius r.	$A = \pi r^2$
Circumference, C, of circle, radius r.	$C = 2\pi r$
Curved surface area, A, of cylinder of radius r, height h.	$A = 2\pi rh$
Curved surface area, A, of cone of radius r, sloping edge l.	$A = \pi rl$
Curved surface area, A, of sphere with radius r.	$A = 4\pi r^2$
Volume, V, of prism, cross-sectional area A, length l.	$V = Al$
Volume, V, of pyramid, base area A, height h.	$V = \frac{1}{2}Ah$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of cone of radius r, height h.	$V = \frac{1}{2}\pi r^2 h$
Volume, V, of sphere of radius r.	$V = \frac{1}{2}\pi r^3$

5. Appendix

List of formulae provided on Extended Papers 2 and 4

Curved surface area, A, of cylinder of radius r, height h. $A = 2\pi rh$

Curved surface area, A, of cone of radius r, sloping edge l. $A = \pi rl$

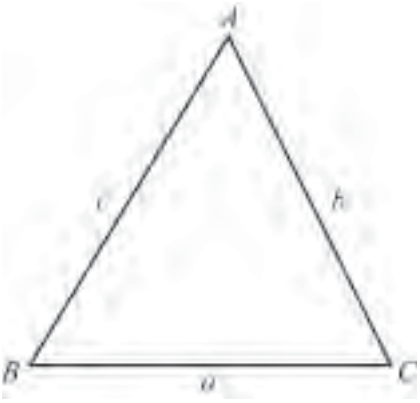
Curved surface area, A, of sphere of radius r. $A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $V = \frac{1}{2}Ah$

Volume, V, of cylinder of radius r, height h. $V = \pi r^2 h$

Volume, V, of cone of radius r, height h. $V = \frac{1}{2}\pi r^2 h$

Volume, V, of sphere of radius r. $V = \frac{1}{2}\pi r^3$



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

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

$$\text{Area} = \frac{1}{2}bc\sin A$$

For the equation $ax^2 + bx + c = 0$ $$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

6. Additional information

6.1 Guided learning hours

IGCSE syllabuses are designed on the assumption that candidates have about 130 guided learning hours per subject over the duration of the course. ('Guided learning hours' include direct teaching and any other supervised or directed study time. They do not include private study by the candidate.)

However, this figure is for guidance only, and the number of hours required may vary according to local curricular practice and the candidates' prior experience of the subject.

6.2 Recommended prior learning

We recommend that candidates who are beginning this course should have previously studied an appropriate lower secondary mathematics programme.

6.3 Progression

IGCSE Certificates are general qualifications that enable candidates to progress either directly to employment, or to proceed to further qualifications.
Candidates who are awarded grades C to A* in IGCSE International Mathematics are well prepared to follow courses leading to AS and A Level Mathematics, or the equivalent.

6.4 Component codes

Because of local variations, in some cases component codes will be different in instructions about making entries for examinations and timetables from those printed in this syllabus, but the component names will be unchanged to make identification straightforward.

6.5 Grading and reporting

IGCSE results are shown by one of the grades A*, A, B, C, D, E, F or G indicating the standard achieved, Grade A* being the highest and Grade G the lowest. 'Ungraded' indicates that the candidate's performance fell short of the standard required for Grade G. 'Ungraded' will be reported on the statement of results but not on the certificate. For some language syllabuses CIE also reports separate oral endorsement grades on a scale of 1 to 5 (1 being the highest).

6. Additional information

Percentage uniform marks are also provided on each candidate's statement of results to supplement their grade for a syllabus. They are determined in this way:

- A candidate who obtains…
  … the minimum mark necessary for a Grade A* obtains a percentage uniform mark of 90%.
  … the minimum mark necessary for a Grade A obtains a percentage uniform mark of 80%.
  … the minimum mark necessary for a Grade B obtains a percentage uniform mark of 70%.
  … the minimum mark necessary for a Grade C obtains a percentage uniform mark of 60%.
  … the minimum mark necessary for a Grade D obtains a percentage uniform mark of 50%.
  … the minimum mark necessary for a Grade E obtains a percentage uniform mark of 40%.
  … the minimum mark necessary for a Grade F obtains a percentage uniform mark of 30%.
  … the minimum mark necessary for a Grade G obtains a percentage uniform mark of 20%.
  … no marks receives a percentage uniform mark of 0%.

Candidates whose mark is none of the above receive a percentage mark in between those stated according to the position of their mark in relation to the grade 'thresholds' (i.e. the minimum mark for obtaining a grade). For example, a candidate whose mark is halfway between the minimum for a Grade C and the minimum for a Grade D (and whose grade is therefore D) receives a percentage uniform mark of 55%.

The uniform percentage mark is stated at syllabus level only. It is not the same as the 'raw' mark obtained by the candidate, since it depends on the position of the grade thresholds (which may vary from one session to another and from one subject to another) and it has been turned into a percentage.

6.6 Resources

Copies of syllabuses, the most recent question papers and Principal Examiners' reports for teachers are available on the Syllabus and Support Materials CD-ROM, which is sent to all CIE Centres.

Resources are also listed on CIE's public website at **www.cie.org.uk**. Please visit this site on a regular basis as the Resource lists are updated through the year.

Access to teachers' email discussion groups, suggested schemes of work and regularly updated resource lists may be found on the CIE Teacher Support website at **http://teachers.cie.org.uk**. This website is available to teachers at registered CIE Centres.

University of Cambridge International Examinations
1 Hills Road, Cambridge, CB1 2EU, United Kingdom
Tel: +44 (0)1223 553554 Fax: +44 (0)1223 553558
Email: international@cie.org.uk Website: www.cie.org.uk