Cambridge Assessment International Education

Syllabus

Cambridge IGCSE™ Mathematics 0580

Use this syllabus for exams in 2025, 2026 and 2027.
Exams are available in the June and November series.
Exams are also available in the March series in India.

Version 3

For the purposes of screen readers, any mention in this document of Cambridge IGCSE refers to Cambridge International General Certificate of Secondary Education.

Cambridge Pathway

Why choose Cambridge International?

Cambridge International prepares school students for life, helping them develop an informed curiosity and a lasting passion for learning. We are part of Cambridge University Press & Assessment, which is a department of the University of Cambridge.

Our Cambridge Pathway gives students a clear path for educational success from age 5 to 19. Schools can shape the curriculum around how they want students to learn – with a wide range of subjects and flexible ways to offer them. It helps students discover new abilities and a wider world, and gives them the skills they need for life, so they can achieve at school, university and work.

Our programmes and qualifications set the global standard for international education. They are created by subject experts, rooted in academic rigour and reflect the latest educational research. They provide a strong platform for learners to progress from one stage to the next, and are well supported by teaching and learning resources.

Our mission is to provide educational benefit through provision of international programmes and qualifications for school education and to be the world leader in this field. Together with schools, we develop Cambridge learners who are confident, responsible, reflective, innovative and engaged – equipped for success in the modern world.

Every year, nearly a million Cambridge students from 10 000 schools in 160 countries prepare for their future with the Cambridge Pathway.

School feedback: 'We think the Cambridge curriculum is superb preparation for university.'

Feedback from: Christoph Guttentag, Dean of Undergraduate Admissions, Duke University, USA

Quality management

Cambridge International is committed to providing exceptional quality. In line with this commitment, our quality management system for the provision of international qualifications and education programmes for students aged 5 to 19 is independently certified as meeting the internationally recognised standard, ISO 9001:2015. Learn more at **www.cambridgeinternational.org/ISO9001**

Contents

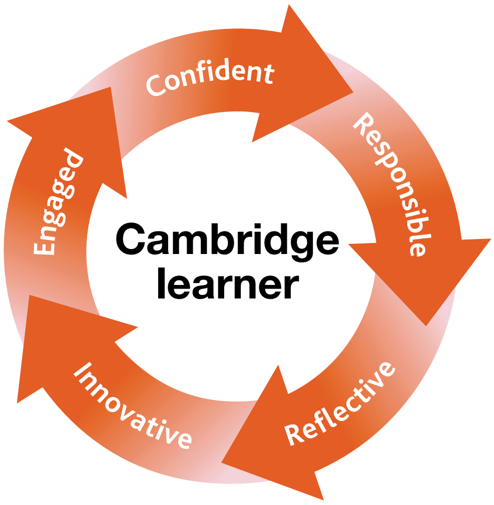
Important: Changes to this syllabus

For information about changes to this syllabus for 2025, 2026 and 2027, go to page 68.

The latest syllabus is version 3, published May 2024.

1 Why choose this syllabus?

Key benefits



Cambridge IGCSE is the world's most popular international qualification for 14 to 16 year olds, although it can be taken by students of other ages. It is tried, tested and trusted.

Students can choose from 70 subjects in any combination – it is taught by over 4500 schools in over 140 countries.

Our programmes balance a thorough knowledge and understanding of a subject and help to develop the skills learners need for their next steps in education or employment.

Cambridge IGCSE Mathematics supports learners in building competency, confidence and fluency in their use of techniques and mathematical understanding. Learners develop a feel for quantity, patterns and relationships, as well as developing reasoning, problem-solving and analytical skills in a variety of abstract and real-life contexts.

Cambridge IGCSE Mathematics provides a strong foundation of mathematical knowledge both for candidates studying mathematics at a higher level and those who will require mathematics to support skills in other subjects.

The course is tiered to allow all candidates to achieve and progress in their mathematical studies.

Our approach in Cambridge IGCSE Mathematics encourages learners to be:

confident, in using mathematical language and techniques to ask questions, explore ideas and communicate

responsible, by taking ownership of their learning, and applying their mathematical knowledge and skills so that they can reason, problem solve and work collaboratively

reflective, by making connections within mathematics and across other subjects, and in evaluating methods and checking solutions

innovative, by applying their knowledge and understanding to solve unfamiliar problems creatively, flexibly and efficiently

engaged, by the beauty, patterns and structure of mathematics, becoming curious to learn about its many applications in society and the economy.

School feedback: 'The strength of Cambridge IGCSE qualifications is internationally recognised and has provided an international pathway for our students to continue their studies around the world.'

Feedback from: Gary Tan, Head of Schools and CEO, Raffles International Group of Schools, Indonesia

International recognition and acceptance

Our expertise in curriculum, teaching and learning, and assessment is the basis for the recognition of our programmes and qualifications around the world. The combination of knowledge and skills in Cambridge IGCSE Mathematics gives learners a solid foundation for further study. Candidates who achieve grades A* to C are well prepared to follow a wide range of courses including Cambridge International AS & A Level Mathematics.

Cambridge IGCSEs are accepted and valued by leading universities and employers around the world as evidence of academic achievement. Many universities require a combination of Cambridge International AS & A Levels and Cambridge IGCSEs or equivalent to meet their entry requirements.

UK NARIC*, the national agency in the UK for the recognition and comparison of international qualifications and skills, has carried out an independent benchmarking study of Cambridge IGCSE and found it to be comparable to the standard of the GCSE in the UK. This means students can be confident that their Cambridge IGCSE qualifications are accepted as equivalent to UK GCSEs by leading universities worldwide.

* Due to the United Kingdom leaving the European Union, the UK NARIC national recognition agency function was re-titled as UK ENIC on 1 March 2021, operated and managed by Ecctis Limited. From 1 March 2021, international benchmarking findings are published under the Ecctis name.

Learn more at **www.cambridgeinternational.org/recognition**

School feedback: 'Cambridge IGCSE is one of the most sought-after and recognised qualifications in the world. It is very popular in Egypt because it provides the perfect preparation for success at advanced level programmes.'

Feedback from: Managing Director of British School of Egypt BSE

Supporting teachers

We provide a wide range of resources, detailed guidance, innovative training and professional development so that you can give your students the best possible preparation for Cambridge IGCSE. To find out which resources are available for each syllabus go to our School Support Hub.

The School Support Hub is our secure online site for Cambridge teachers where you can find the resources you need to deliver our programmes. You can also keep up to date with your subject and the global Cambridge community through our online discussion forums.

Find out more at **www.cambridgeinternational.org/support**

Support for Cambridge IGCSE			
Planning and preparation	**Teaching and assessment**	**Learning and revision**	**Results**
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- Introductory Training – face-to-face or online
- Extension Training – face-to-face or online
- Enrichment Professional Development – face-to-face or online

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- Cambridge Professional Development Qualifications

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Supporting exams officers

We provide comprehensive support and guidance for all Cambridge exams officers.
Find out more at: **www.cambridgeinternational.org/eoguide**

2 Syllabus overview

Aims

The aims describe the purposes of a course based on this syllabus.

The aims are to enable students to:

- develop a positive attitude towards mathematics in a way that encourages enjoyment, establishes confidence and promotes enquiry and further learning
- develop a feel for number and understand the significance of the results obtained
- apply their mathematical knowledge and skills to their own lives and the world around them
- use creativity and resilience to analyse and solve problems
- communicate mathematics clearly
- develop the ability to reason logically, make inferences and draw conclusions
- develop fluency so that they can appreciate the interdependence of, and connections between, different areas of mathematics
- acquire a foundation for further study in mathematics and other subjects.

Cambridge Assessment International Education is an education organisation and politically neutral. The contents of this syllabus, examination papers and associated materials do not endorse any political view. We endeavour to treat all aspects of the exam process neutrally.

Content overview

All candidates study the following topics:

1 Number
2 Algebra and graphs
3 Coordinate geometry
4 Geometry
5 Mensuration
6 Trigonometry
7 Transformations and vectors
8 Probability
9 Statistics

Cambridge IGCSE Mathematics is tiered to enable effective differentiation for learners. The Core subject content is intended for learners targeting grades C–G, and the Extended subject content is intended for learners targeting grades A*–C. The Extended subject content contains the Core subject content as well as additional content.

The subject content is organised by topic and is **not** presented in a teaching order. This content structure and the use of tiering allows flexibility for teachers to plan delivery in a way that is appropriate for their learners. Learners are expected to use techniques listed in the content and apply them to solve problems with or without the use of a calculator, as appropriate.

Assessment overview

All candidates take two components.

Candidates who have studied the Core subject content, or who are expected to achieve a grade D or below, should be entered for Paper 1 and Paper 3. These candidates will be eligible for grades C to G.

Candidates who have studied the Extended subject content, and who are expected to achieve a grade C or above, should be entered for Paper 2 and Paper 4. These candidates will be eligible for grades A* to E.

Candidates should have a scientific calculator for Paper 3 and Paper 4. Calculators are **not** allowed for Paper 1 and Paper 2.

Please see the *Cambridge Handbook* at **www.cambridgeinternational.org/eoguide** for guidance on use of calculators in the examinations.

Core assessment

Core candidates take Paper 1 and Paper 3. The questions are based on the Core subject content only:

Paper 1: Non-calculator (Core)		**Paper 3: Calculator (Core)**	
1 hour 30 minutes		1 hour 30 minutes	
80 marks	50%	80 marks	50%
Structured and unstructured questions		Structured and unstructured questions	
Use of a calculator is **not** allowed		A scientific calculator is required	
Externally assessed		Externally assessed	

Extended assessment

Extended candidates take Paper 2 and Paper 4. The questions are based on the Extended subject content only:

Paper 2: Non-calculator (Extended)		**Paper 4: Calculator (Extended)**	
2 hours		2 hours	
100 marks	50%	100 marks	50%
Structured and unstructured questions		Structured and unstructured questions	
Use of a calculator is **not** allowed		A scientific calculator is required	
Externally assessed		Externally assessed	

Information on availability is in the **Before you start** section.

Assessment objectives

The assessment objectives (AOs) are:

AO1 Knowledge and understanding of mathematical techniques

Candidates should be able to:

- recall and apply mathematical knowledge and techniques
- carry out routine procedures in mathematical and everyday situations
- understand and use mathematical notation and terminology
- perform calculations with and without a calculator
- organise, process, present and understand information in written form, tables, graphs and diagrams
- estimate, approximate and work to degrees of accuracy appropriate to the context and convert between equivalent numerical forms
- understand and use measurement systems in everyday use
- measure and draw using geometrical instruments to an appropriate degree of accuracy
- recognise and use spatial relationships in two and three dimensions.

AO2 Analyse, interpret and communicate mathematically

Candidates should be able to:

- analyse a problem and identify a suitable strategy to solve it, including using a combination of processes where appropriate
- make connections between different areas of mathematics
- recognise patterns in a variety of situations and make and justify generalisations
- make logical inferences and draw conclusions from mathematical data or results
- communicate methods and results in a clear and logical form
- interpret information in different forms and change from one form of representation to another.

Weighting for assessment objectives

The approximate weightings allocated to each of the assessment objectives (AOs) are summarised below.

Assessment objectives as a percentage of the Core qualification

Assessment objective	Weighting in IGCSE %
AO1 Knowledge and understanding of mathematical techniques	60–70
AO2 Analyse, interpret and communicate mathematically	30–40
Total	100

Assessment objectives as a percentage of the Extended qualification

Assessment objective	Weighting in IGCSE %
AO1 Knowledge and understanding of mathematical techniques	40–50
AO2 Analyse, interpret and communicate mathematically	50–60
Total	100

Assessment objectives as a percentage of each component

Assessment objective	Weighting in components %			
	Paper 1	Paper 2	Paper 3	Paper 4
AO1 Knowledge and understanding of mathematical techniques	60–70	40–50	60–70	40–50
AO2 Analyse, interpret and communicate mathematically	30–40	50–60	30–40	50–60
Total	100	100	100	100

3 Subject content

This syllabus gives you the flexibility to design a course that will interest, challenge and engage your learners. Where appropriate you are responsible for selecting resources and examples to support your learners' study. These should be appropriate for the learners' age, cultural background and learning context as well as complying with your school policies and local legal requirements.

Learners should pursue an integrated course that allows them to fully develop their skills and understanding both with and without the use of a calculator.

Candidates study either the Core subject content or the Extended subject content. Candidates aiming for grades A* to C should study the Extended subject content.

A List of formulas is provided on page 2 of the examination papers for candidates to refer to during the examinations. Please note that not all required formulas are given; the 'Notes and examples' column of the subject content will indicate where a formula is given in the examination papers and when a formula is **not** given, i.e. knowledge of a formula is required.

Core subject content

1 Number

C1.1 Types of number	Notes and examples
Identify and use: • natural numbers • integers (positive, zero and negative) • prime numbers • square numbers • cube numbers • common factors • common multiples • rational and irrational numbers • reciprocals.	Example tasks include: • convert between numbers and words, e.g. six billion is 6 000 000 000 10 007 is ten thousand and seven • express 72 as a product of its prime factors • find the highest common factor (HCF) of two numbers • find the lowest common multiple (LCM) of two numbers.

1 Number (continued)

C1.2 Sets	Notes and examples
Understand and use set language, notation and Venn diagrams to describe sets.	Venn diagrams are limited to two sets. The following set notation will be used: • $\mathrm{n}(A)$ Number of elements in set A • A' Complement of set A • $\mathscr{E}$ Universal set • $A \cup B$ Union of A and B • $A \cap B$ Intersection of A and B. Example definition of sets: $A = \{x\text{: } x \text{ is a natural number}\}$ $B = \{a, b, c, \ldots\}$ $C = \{x\text{: } a \leqslant x \leqslant b\}$.

C1.3 Powers and roots	Notes and examples
Calculate with the following: • squares • square roots • cubes • cube roots • other powers and roots of numbers.	Includes recall of squares and their corresponding roots from 1 to 15, and recall of cubes and their corresponding roots of 1, 2, 3, 4, 5 and 10, e.g.: • Write down the value of $\sqrt{169}$. • Work out $5^2 \times \sqrt[3]{8}$.

C1.4 Fractions, decimals and percentages	Notes and examples
1 Use the language and notation of the following in appropriate contexts: • proper fractions • improper fractions • mixed numbers • decimals • percentages.	Candidates are expected to be able to write fractions in their simplest form. Candidates are **not** expected to use recurring decimal notation.
2 Recognise equivalence and convert between these forms.	Candidates are **not** expected to demonstrate the conversion of a recurring decimal to a fraction and vice versa.

C1.5 Ordering	Notes and examples
Order quantities by magnitude and demonstrate familiarity with the symbols $=$, $\neq$, $>$, $<$, $\geqslant$ and $\leqslant$.	

1 Number (continued)

C1.6 The four operations	Notes and examples
Use the four operations for calculations with integers, fractions and decimals, including correct ordering of operations and use of brackets.	Includes: • negative numbers • improper fractions • mixed numbers • practical situations, e.g. temperature changes.

C1.7 Indices I	Notes and examples
1 Understand and use indices (positive, zero and negative integers).	e.g. find the value of 7^{-2}.
2 Understand and use the rules of indices.	e.g. find the value of $2^{-3} \times 2^4$, $(2^3)^2$, $2^3 \div 2^4$.

C1.8 Standard form	Notes and examples
1 Use the standard form $A \times 10^n$ where n is a positive or negative integer and $1 \leqslant A < 10$.	
2 Convert numbers into and out of standard form.	
3 Calculate with values in standard form.	Core candidates are expected to calculate with standard form only on Paper 3.

C1.9 Estimation	Notes and examples
1 Round values to a specified degree of accuracy.	Includes decimal places and significant figures. e.g. write 5764 correct to the nearest thousand.
2 Make estimates for calculations involving numbers, quantities and measurements.	e.g. by writing each number correct to 1 significant figure, estimate the value of $\dfrac{41.3}{9.79 \times 0.765}$.
3 Round answers to a reasonable degree of accuracy in the context of a given problem.	

C1.10 Limits of accuracy	Notes and examples
Give upper and lower bounds for data rounded to a specified accuracy.	e.g. write down the upper bound of a length measured correct to the nearest metre. Candidates are **not** expected to find the bounds of the results of calculations which have used data rounded to a specified accuracy.

1 Number (continued)

C1.11 Ratio and proportion	Notes and examples
Understand and use ratio and proportion to:	
• give ratios in their simplest form	e.g. 20 : 30 : 40 in its simplest form is 2 : 3 : 4.
• divide a quantity in a given ratio	
• use proportional reasoning and ratios in context.	e.g. adapt recipes; use map scales; determine best value.

C1.12 Rates	Notes and examples
1 Use common measures of rate.	e.g. calculate with: • hourly rates of pay • exchange rates between currencies • flow rates • fuel consumption.
2 Apply other measures of rate.	e.g. calculate with: • pressure • density • population density. Required formulas will be given in the question.
3 Solve problems involving average speed.	Knowledge of speed/distance/time formula is required. e.g. A cyclist travels 45 km in 3 hours 45 minutes. What is their average speed? Notation used will be, e.g. m/s (metres per second), g/cm^3 (grams per cubic centimetre).

C1.13 Percentages	Notes and examples
1 Calculate a given percentage of a quantity.	
2 Express one quantity as a percentage of another.	
3 Calculate percentage increase or decrease.	
4 Calculate with simple and compound interest.	Formulas are **not** given. Percentage calculations may include: • deposit • discount • profit and loss (as an amount or a percentage) • earnings • percentages over 100%.

1 Number (continued)

C1.14 Using a calculator	Notes and examples
1 Use a calculator efficiently.	e.g. know not to round values within a calculation and to only round the final answer.
2 Enter values appropriately on a calculator.	e.g. enter 2 hours 30 minutes as 2.5 hours or 2° 30’ 0’’.
3 Interpret the calculator display appropriately.	e.g. in money 4.8 means \$4.80; in time 3.25 means 3 hours 15 minutes.

C1.15 Time	Notes and examples
1 Calculate with time: seconds (s), minutes (min), hours (h), days, weeks, months, years, including the relationship between units.	1 year = 365 days.
2 Calculate times in terms of the 24-hour and 12-hour clock.	In the 24-hour clock, for example, 3.15 a.m. will be denoted by 03 15 and 3.15 p.m. by 15 15.
3 Read clocks and timetables.	Includes problems involving time zones, local times and time differences.

C1.16 Money	Notes and examples
1 Calculate with money.	
2 Convert from one currency to another.	

C1.17 Extended content only.

C1.18 Extended content only.

2 Algebra and graphs

C2.1 Introduction to algebra	Notes and examples
1 Know that letters can be used to represent generalised numbers.	
2 Substitute numbers into expressions and formulas.	

C2.2 Algebraic manipulation	Notes and examples
1 Simplify expressions by collecting like terms.	Simplify means give the answer in its simplest form, e.g. $2a + 3b + 5a - 9b = 7a - 6b$.
2 Expand products of algebraic expressions.	e.g. expand $3x(2x - 4y)$. Includes products of two brackets involving one variable, e.g. expand $(2x + 1)(x - 4)$.
3 Factorise by extracting common factors.	Factorise means factorise fully, e.g. $9x^2 + 15xy = 3x(3x + 5y)$.

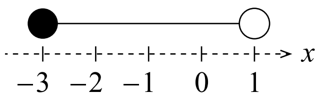
C2.3 Extended content only.

C2.4 Indices II	Notes and examples
1 Understand and use indices (positive, zero and negative).	e.g. $2^x = 32$. Find the value of x.
2 Understand and use the rules of indices.	e.g. simplify: • $(5x^3)^2$ • $12a^5 \div 3a^{-2}$ • $6x^7y^4 \times 5x^{-5}y$. Knowledge of logarithms is **not** required.

C2.5 Equations	Notes and examples
1 Construct simple expressions, equations and formulas.	e.g. write an expression for a number that is 2 more than n. Includes constructing linear simultaneous equations.
2 Solve linear equations in one unknown. 3 Solve simultaneous linear equations in two unknowns.	Examples include: • $3x + 4 = 10$ • $5 - 2x = 3(x + 7)$.
4 Change the subject of simple formulas.	e.g. change the subject of formulas where: • the subject only appears once • there is **not** a power or root of the subject.

2 Algebra and graphs (continued)

C2.6 Inequalities	**Notes and examples**
Represent and interpret inequalities, including on a number line.	When representing and interpreting inequalities on a number line: • open circles should be used to represent strict inequalities ($<$, $>$) • closed circles should be used to represent inclusive inequalities ($\leqslant$, $\geqslant$) e.g. $-3 \leqslant x < 1$



C2.7 Sequences	**Notes and examples**
1 Continue a given number sequence or pattern.	e.g. write the next two terms in this sequence: $1, 3, 6, 10, 15, \dots, \dots$
2 Recognise patterns in sequences, including the term-to-term rule, and relationships between different sequences.	
3 Find and use the nth term of the following sequences:	
(a) linear	
(b) simple quadratic	e.g. find the nth term of $2, 5, 10, 17$
(c) simple cubic.	

C2.8 Extended content only.

C2.9 Graphs in practical situations	**Notes and examples**
1 Use and interpret graphs in practical situations including travel graphs and conversion graphs.	e.g. interpret the gradient of a straight-line graph as a rate of change.
2 Draw graphs from given data.	e.g. draw a distance–time graph to represent a journey.

2 Algebra and graphs (continued)

C2.10 Graphs of functions	Notes and examples
1 Construct tables of values, and draw, recognise and interpret graphs for functions of the following forms: • $ax + b$ • $\pm x^2 + ax + b$ • $\frac{a}{x}$ $(x \neq 0)$ where a and b are integer constants.	
2 Solve associated equations graphically, including finding and interpreting roots by graphical methods.	e.g. find the intersection of a line and a curve.

C2.11 Sketching curves	Notes and examples
Recognise, sketch and interpret graphs of the following functions:	
(a) linear	
(b) quadratic.	Knowledge of symmetry and roots is required. Knowledge of turning points is **not** required.

C2.12 Extended content only.

C2.13 Extended content only.

3 Coordinate geometry

C3.1 Coordinates	Notes and examples
Use and interpret Cartesian coordinates in two dimensions.	

C3.2 Drawing linear graphs	Notes and examples
Draw straight-line graphs for linear equations.	Equations will be given in the form $y = mx + c$ (e.g. $y = -2x + 5$), unless a table of values is given.

C3.3 Gradient of linear graphs	Notes and examples
Find the gradient of a straight line.	From a grid only.

C3.4 Extended content only.

C3.5 Equations of linear graphs	Notes and examples
Interpret and obtain the equation of a straight-line graph in the form $y = mx + c$.	Questions may: • use and request lines in the forms $y = mx + c$ $x = k$ • involve finding the equation when the graph is given • ask for the gradient or y-intercept of a graph from an equation, e.g. find the gradient and y-intercept of the graph with the equation $y = 6x + 3$. Candidates are expected to give equations of a line in a fully simplified form.

C3.6 Parallel lines	Notes and examples
Find the gradient and equation of a straight line parallel to a given line.	e.g. find the equation of the line parallel to $y = 4x - 1$ that passes through $(1, -3)$.

C3.7 Extended content only.

4 Geometry

C4.1 Geometrical terms	Notes and examples
1 Use and interpret the following geometrical terms: • point • vertex • line • parallel • perpendicular • bearing • right angle • acute, obtuse and reflex angles • interior and exterior angles • similar • congruent • scale factor.	Candidates are **not** expected to show that two shapes are congruent.
2 Use and interpret the vocabulary of: • triangles • special quadrilaterals • polygons • nets • simple solids.	Includes the following terms: Triangles: • equilateral • isosceles • scalene • right-angled. Quadrilaterals: • square • rectangle • kite • rhombus • parallelogram • trapezium. Polygons: • regular and irregular polygons • pentagon • hexagon • octagon • decagon. *continued*

4 Geometry (continued)

C4.1 Geometrical terms (continued)	Notes and examples
	Simple solids: • cube • cuboid • prism • cylinder • pyramid • cone • sphere (term 'hemisphere' **not** required) • face • surface • edge.
3 Use and interpret the vocabulary of a circle.	Includes the following terms: • centre • radius (plural radii) • diameter • circumference • semicircle • chord • tangent • arc • sector • segment.

C4.2 Geometrical constructions	Notes and examples
1 Measure and draw lines and angles.	A ruler should be used for all straight edges. Constructions of perpendicular bisectors and angle bisectors are **not** required.
2 Construct a triangle, given the lengths of all sides, using a ruler and pair of compasses only.	e.g. construct a rhombus by drawing two triangles. Construction arcs must be shown.
3 Draw, use and interpret nets.	Examples include: • draw nets of cubes, cuboids, prisms and pyramids • use measurements from nets to calculate volumes and surface areas.

4 Geometry (continued)

C4.3 Scale drawings	Notes and examples
1 Draw and interpret scale drawings.	A ruler must be used for all straight edges.
2 Use and interpret three-figure bearings.	Bearings are measured clockwise from north (000° to 360°). e.g. find the bearing of A from B if the bearing of B from A is 025°. Includes an understanding of the terms north, east, south and west. e.g. point D is due east of point C.

C4.4 Similarity	Notes and examples
Calculate lengths of similar shapes.	

C4.5 Symmetry	Notes and examples
Recognise line symmetry and order of rotational symmetry in two dimensions.	Includes properties of triangles, quadrilaterals and polygons directly related to their symmetries.

C4.6 Angles	Notes and examples
1 Calculate unknown angles and give simple explanations using the following geometrical properties: • sum of angles at a point = 360° • sum of angles at a point on a straight line = 180° • vertically opposite angles are equal • angle sum of a triangle = 180° and angle sum of a quadrilateral = 360°.	Knowledge of three-letter notation for angles is required, e.g. angle ABC. Candidates are expected to use the correct geometrical terminology when giving reasons for answers.
2 Calculate unknown angles and give geometric explanations for angles formed within parallel lines: • corresponding angles are equal • alternate angles are equal • co-interior angles sum to 180° (supplementary).	
3 Know and use angle properties of regular polygons.	Includes exterior and interior angles, and angle sum.

4 Geometry (continued)

C4.7 Circle theorems	Notes and examples
Calculate unknown angles and give explanations using the following geometrical properties of circles: • angle in a semicircle = 90° • angle between tangent and radius = 90°.	Candidates will be expected to use the geometrical properties listed in the syllabus when giving reasons for answers.

C4.8 Extended content only.

5 Mensuration

C5.1 Units of measure	Notes and examples
Use metric units of mass, length, area, volume and capacity in practical situations and convert quantities into larger or smaller units.	Units include: • mm, cm, m, km • mm^2, cm^2, m^2, km^2 • mm^3, cm^3, m^3 • ml, l • g, kg. Conversion between units includes: • between different units of area, e.g. $cm^2 \leftrightarrow m^2$ • between units of volume and capacity, e.g. $m^3 \leftrightarrow$ litres.

C5.2 Area and perimeter	Notes and examples
Carry out calculations involving the perimeter and area of a rectangle, triangle, parallelogram and trapezium.	Except for area of a triangle, formulas are **not** given.

C5.3 Circles, arcs and sectors	Notes and examples
1 Carry out calculations involving the circumference and area of a circle. 2 Carry out calculations involving arc length and sector area as fractions of the circumference and area of a circle, where the sector angle is a factor of 360°.	Answers may be asked for in terms of π. Formulas are given in the List of formulas.

C5.4 Surface area and volume	Notes and examples
Carry out calculations and solve problems involving the surface area and volume of a: • cuboid • prism • cylinder • sphere • pyramid • cone.	Answers may be asked for in terms of π. The following formulas are given in the List of formulas: • curved surface area of a cylinder • curved surface area of a cone • surface area of a sphere • volume of a prism • volume of a pyramid • volume of a cylinder • volume of a cone • volume of a sphere. The term prism refers to any solid with a uniform cross-section, e.g. a cylindrical sector.

5 Mensuration (continued)

C5.5 Compound shapes and parts of shapes	Notes and examples
1 Carry out calculations and solve problems involving perimeters and areas of: • compound shapes • parts of shapes.	Answers may be asked for in terms of π.
2 Carry out calculations and solve problems involving surface areas and volumes of: • compound solids • parts of solids.	e.g. find the volume of half of a sphere.

6 Trigonometry

C6.1 Pythagoras' theorem	Notes and examples
Know and use Pythagoras' theorem.	

C6.2 Right-angled triangles	
1 Know and use the sine, cosine and tangent ratios for acute angles in calculations involving sides and angles of a right-angled triangle.	Angles will be given in degrees and answers should be written in degrees, with decimals correct to one decimal place.
2 Solve problems in two dimensions using Pythagoras' theorem and trigonometry.	Knowledge of bearings may be required.

C6.3 Extended content only.

C6.4 Extended content only.

C6.5 Extended content only.

C6.6 Extended content only.

7 Transformations and vectors

C7.1 Transformations	Notes and examples
Recognise, describe and draw the following transformations: 1 Reflection of a shape in a vertical or horizontal line. 2 Rotation of a shape about the origin, vertices or midpoints of edges of the shape, through multiples of 90°.	Questions will **not** involve combinations of transformations. A ruler must be used for all straight edges.
3 Enlargement of a shape from a centre by a scale factor. 4 Translation of a shape by a vector $\begin{pmatrix} x \\ y \end{pmatrix}$.	Positive and fractional scale factors only.

C7.2 Extended content only.

C7.3 Extended content only.

C7.4 Extended content only.

8 Probability

C8.1 Introduction to probability	Notes and examples
1 Understand and use the probability scale from 0 to 1.	Probability notation is **not** required. Probabilities should be given as a fraction, decimal or percentage. Problems may require using information from tables, graphs or Venn diagrams (limited to two sets).
2 Calculate the probability of a single event.	
3 Understand that the probability of an event not occurring = 1 – the probability of the event occurring.	e.g. The probability that a counter is blue is 0.8. What is the probability that it is not blue?

C8.2 Relative and expected frequencies	Notes and examples
1 Understand relative frequency as an estimate of probability.	e.g. use results of experiments with a spinner to estimate the probability of a given outcome.
2 Calculate expected frequencies.	e.g. use probability to estimate an expected value from a population. Includes understanding what is meant by fair, bias and random.

C8.3 Probability of combined events	Notes and examples
Calculate the probability of combined events using, where appropriate:	Combined events will only be with replacement.
• sample space diagrams	
• Venn diagrams	Venn diagrams will be limited to two sets.
• tree diagrams.	In tree diagrams, outcomes will be written at the end of the branches and probabilities by the side of the branches.

C8.4 Extended content only.

9 Statistics

C9.1 Classifying statistical data	Notes and examples
Classify and tabulate statistical data.	e.g. tally tables, two-way tables.

C9.2 Interpreting statistical data	Notes and examples
1 Read, interpret and draw inferences from tables and statistical diagrams.	
2 Compare sets of data using tables, graphs and statistical measures.	e.g. compare averages and ranges between two data sets.
3 Appreciate restrictions on drawing conclusions from given data.	

C9.3 Averages and range	Notes and examples
Calculate the mean, median, mode and range for individual data and distinguish between the purposes for which these are used.	Data may be in a list or frequency table, but will not be grouped.

C9.4 Statistical charts and diagrams	Notes and examples
Draw and interpret:	
(a) bar charts	Includes composite (stacked) and dual (side-by-side) bar charts.
(b) pie charts	
(c) pictograms	
(d) stem-and-leaf diagrams	Stem-and-leaf diagrams should have ordered data with a key.
(e) simple frequency distributions.	

9 Statistics (continued)

C9.5 Scatter diagrams	Notes and examples
1 Draw and interpret scatter diagrams.	Plotted points should be clearly marked, for example as small crosses (×).
2 Understand what is meant by positive, negative and zero correlation.	
3 Draw by eye, interpret and use a straight line of best fit.	A line of best fit: • should be a single ruled line drawn by inspection • should extend across the full data set • does not need to coincide exactly with any of the points but there should be a roughly even distribution of points either side of the line over its entire length.

C9.6 Extended content only.

C9.7 Extended content only.

Extended subject content

1 Number

E1.1 Types of number	Notes and examples
Identify and use: • natural numbers • integers (positive, zero and negative) • prime numbers • square numbers • cube numbers • common factors • common multiples • rational and irrational numbers • reciprocals.	Example tasks include: • convert between numbers and words, e.g. six billion is 6 000 000 000 10 007 is ten thousand and seven • express 72 as a product of its prime factors • find the highest common factor (HCF) of two numbers • find the lowest common multiple (LCM) of two numbers.

E1.2 Sets	Notes and examples
Understand and use set language, notation and Venn diagrams to describe sets and represent relationships between sets.	Venn diagrams are limited to two or three sets. The following set notation will be used: • $\mathrm{n}(A)$ Number of elements in set A • $\in$ "… is an element of …" • $\notin$ "… is not an element of …" • A' Complement of set A • $\emptyset$ The empty set • $\mathscr{E}$ Universal set • $A \subseteq B$ A is a subset of B • $A \not\subseteq B$ A is not a subset of B • $A \cup B$ Union of A and B • $A \cap B$ Intersection of A and B. Example definition of sets: $A = \{x: x \text{ is a natural number}\}$ $B = \{(x, y): y = mx + c\}$ $C = \{x: a \leqslant x \leqslant b\}$ $D = \{a, b, c, \ldots\}$.

E1.3 Powers and roots	Notes and examples
Calculate with the following: • squares • square roots • cubes • cube roots • other powers and roots of numbers.	Includes recall of squares and their corresponding roots from 1 to 15, and recall of cubes and their corresponding roots of 1, 2, 3, 4, 5 and 10, e.g.: • Write down the value of $\sqrt{169}$. • Work out $5^2 \times \sqrt[3]{8}$.

1 Number (continued)

E1.4 Fractions, decimals and percentages	Notes and examples
1 Use the language and notation of the following in appropriate contexts: • proper fractions • improper fractions • mixed numbers • decimals • percentages.	Candidates are expected to be able to write fractions in their simplest form. Recurring decimal notation **is** required, e.g. • $0.1\dot{7} = 0.1777\ldots$ • $0.1\dot{2}\dot{3} = 0.1232323\ldots$ • $0.\overline{123} = 0.123123\ldots$
2 Recognise equivalence and convert between these forms.	Includes converting between recurring decimals and fractions and vice versa, e.g. write $0.1\dot{7}$ as a fraction.

E1.5 Ordering	Notes and examples
Order quantities by magnitude and demonstrate familiarity with the symbols =, ≠, >, < , ⩾ and ⩽.	

E1.6 The four operations	Notes and examples
Use the four operations for calculations with integers, fractions and decimals, including correct ordering of operations and use of brackets.	Includes: • negative numbers • improper fractions • mixed numbers • practical situations, e.g. temperature changes.

E1.7 Indices I	Notes and examples
1 Understand and use indices (positive, zero, negative, and fractional).	Examples include: • $6^{\frac{1}{2}} = \sqrt{6}$ • $16^{\frac{1}{4}} = \sqrt[4]{16}$ • find the value of 7^{-2}, $81^{\frac{1}{2}}$, $8^{-\frac{2}{3}}$.
2 Understand and use the rules of indices.	e.g. find the value of $2^{-3} \times 2^4$, $(2^3)^2$, $2^3 \div 2^4$.

E1.8 Standard form	Notes and examples
1 Use the standard form $A \times 10^n$ where n is a positive or negative integer and $1 \leqslant A < 10$.	
2 Convert numbers into and out of standard form.	
3 Calculate with values in standard form.	

1 Number (continued)

E1.9 Estimation	Notes and examples
1 Round values to a specified degree of accuracy.	Includes decimal places and significant figures.
2 Make estimates for calculations involving numbers, quantities and measurements.	e.g. write 5764 correct to the nearest thousand. e.g. by writing each number correct to 1 significant figure, estimate the value of $\dfrac{41.3}{9.79 \times 0.765}$.
3 Round answers to a reasonable degree of accuracy in the context of a given problem.	

E1.10 Limits of accuracy	Notes and examples
1 Give upper and lower bounds for data rounded to a specified accuracy.	e.g. write down the upper bound of a length measured correct to the nearest metre.
2 Find upper and lower bounds of the results of calculations which have used data rounded to a specified accuracy.	Example calculations include: • calculate the upper bound of the perimeter or the area of a rectangle given dimensions measured to the nearest centimetre • find the lower bound of the speed given rounded values of distance and time.

E1.11 Ratio and proportion	Notes and examples
Understand and use ratio and proportion to:	
• give ratios in their simplest form	e.g. $20 : 30 : 40$ in its simplest form is $2 : 3 : 4$.
• divide a quantity in a given ratio	
• use proportional reasoning and ratios in context.	e.g. adapt recipes; use map scales; determine best value.

1 Number (continued)

E1.12 Rates	Notes and examples
1 Use common measures of rate.	e.g. calculate with: • hourly rates of pay • exchange rates between currencies • flow rates • fuel consumption.
2 Apply other measures of rate.	e.g. calculate with: • pressure • density • population density. Required formulas will be given in the question.
3 Solve problems involving average speed.	Knowledge of speed/distance/time formula is required. e.g. A cyclist travels 45 km in 3 hours 45 minutes. What is their average speed? Notation used will be, e.g. m/s (metres per second), g/cm^3 (grams per cubic centimetre).

E1.13 Percentages	Notes and examples
1 Calculate a given percentage of a quantity.	
2 Express one quantity as a percentage of another.	
3 Calculate percentage increase or decrease.	
4 Calculate with simple and compound interest.	Problems may include repeated percentage change. Formulas are **not** given.
5 Calculate using reverse percentages.	e.g. find the cost price given the selling price and the percentage profit. Percentage calculations may include: • deposit • discount • profit and loss (as an amount or a percentage) • earnings • percentages over 100%.

E1.14 Using a calculator	Notes and examples
1 Use a calculator efficiently.	e.g. know not to round values within a calculation and to only round the final answer.
2 Enter values appropriately on a calculator.	e.g. enter 2 hours 30 minutes as 2.5 hours or 2° 30’ 0’’.
3 Interpret the calculator display appropriately.	e.g. in money 4.8 means \$4.80; in time 3.25 means 3 hours 15 minutes.

1 Number (continued)

E1.15 Time	Notes and examples
1 Calculate with time: seconds (s), minutes (min), hours (h), days, weeks, months, years, including the relationship between units.	1 year = 365 days.
2 Calculate times in terms of the 24-hour and 12-hour clock.	In the 24-hour clock, for example, 3.15 a.m. will be denoted by 03 15 and 3.15 p.m. by 15 15.
3 Read clocks and timetables.	Includes problems involving time zones, local times and time differences.

E1.16 Money	Notes and examples
1 Calculate with money.	
2 Convert from one currency to another.	

E1.17 Exponential growth and decay	Notes and examples
Use exponential growth and decay.	e.g. depreciation, population change. Knowledge of *e* is **not** required.

E1.18 Surds	Notes and examples
1 Understand and use surds, including simplifying expressions.	Examples include: • $\sqrt{20} = 2\sqrt{5}$ • $\sqrt{200} - \sqrt{32} = 6\sqrt{2}$.
2 Rationalise the denominator.	Examples include: • $\frac{10}{\sqrt{5}} = 2\sqrt{5}$ • $\frac{1}{-1+\sqrt{3}} = \frac{1+\sqrt{3}}{2}$.

2 Algebra and graphs

E2.1 Introduction to algebra	Notes and examples
1 Know that letters can be used to represent generalised numbers.	
2 Substitute numbers into expressions and formulas.	

E2.2 Algebraic manipulation	Notes and examples
1 Simplify expressions by collecting like terms.	Simplify means give the answer in its simplest form, e.g. $2a^2 + 3ab - 1 + 5a^2 - 9ab + 4 = 7a^2 - 6ab + 3$.
2 Expand products of algebraic expressions.	e.g. expand $3x(2x - 4y)$, $(3x + y)(x - 4y)$. Includes products of more than two brackets, e.g. expand $(x - 2)(x + 3)(2x + 1)$.
3 Factorise by extracting common factors.	Factorise means factorise fully, e.g. $9x^2 + 15xy = 3x(3x + 5y)$.
4 Factorise expressions of the form: • $ax + bx + kay + kby$ • $a^2x^2 - b^2y^2$ • $a^2 + 2ab + b^2$ • $ax^2 + bx + c$ • $ax^3 + bx^2 + cx$.	
5 Complete the square for expressions in the form $ax^2 + bx + c$.	

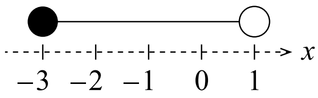
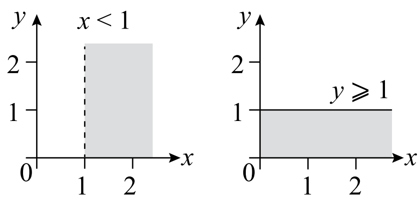
E2.3 Algebraic fractions	Notes and examples
1 Manipulate algebraic fractions.	Examples include: • $\frac{x}{3} + \frac{x-4}{2}$ • $\frac{2x}{3} - \frac{3(x-5)}{2}$ • $\frac{3a}{4} \times \frac{9a}{10}$ • $\frac{3a}{4} \div \frac{9a}{10}$ • $\frac{1}{x-2} + \frac{x+1}{x-3}$.
2 Factorise and simplify rational expressions.	e.g. $\frac{x^2 - 2x}{x^2 - 5x + 6}$.

2 Algebra and graphs (continued)

E2.4 Indices II	Notes and examples
1 Understand and use indices (positive, zero, negative and fractional).	e.g. solve: • $32^x = 2$ • $5^{x+1} = 25^x$.
2 Understand and use the rules of indices.	e.g. simplify: • $3x^{-4} \times \frac{2}{3}x^{\frac{1}{2}}$ • $\frac{2}{5}x^{\frac{1}{2}} \div 2x^{-2}$ • $\left(\frac{2x^5}{3}\right)^3$. Knowledge of logarithms is **not** required.

E2.5 Equations	Notes and examples
1 Construct expressions, equations and formulas.	e.g. write an expression for the product of two consecutive even numbers. Includes constructing simultaneous equations.
2 Solve linear equations in one unknown.	Examples include: • $3x + 4 = 10$ • $5 - 2x = 3(x + 7)$.
3 Solve fractional equations with numerical and linear algebraic denominators.	Examples include: • $\frac{x}{2x+1} = 4$ • $\frac{2}{x+2} + \frac{3}{2x-1} = 1$ • $\frac{x}{x+2} = \frac{3}{x-6}$.
4 Solve simultaneous linear equations in two unknowns.	
5 Solve simultaneous equations, involving one linear and one non-linear.	With powers no higher than two.
6 Solve quadratic equations by factorisation, completing the square and by use of the quadratic formula.	Includes writing a quadratic expression in completed square form. Candidates may be expected to give solutions in surd form. The quadratic formula is given in the List of formulas.
7 Change the subject of formulas.	e.g. change the subject of a formula where: • the subject appears twice • there is a power or root of the subject.

2 Algebra and graphs (continued)

E2.6 Inequalities	**Notes and examples**
1 Represent and interpret inequalities, including on a number line.	When representing and interpreting inequalities on a number line: • open circles should be used to represent strict inequalities (<, >) • closed circles should be used to represent inclusive inequalities (⩽, ⩾). e.g. $-3 \leqslant x < 1$ 
2 Construct, solve and interpret linear inequalities.	Examples include: • $3x < 2x + 4$ • $-3 \leqslant 3x - 2 < 7$.
3 Represent and interpret linear inequalities in two variables graphically.	The following conventions should be used: • broken lines should be used to represent strict inequalities (<, >) • solid lines should be used to represent inclusive inequalities (⩽, ⩾) • shading should be used to represent unwanted regions (unless otherwise directed in the question). e.g. 
4 List inequalities that define a given region.	Linear programming problems are **not** included.

E2.7 Sequences	**Notes and examples**
1 Continue a given number sequence or pattern.	Subscript notation may be used, e.g. T_n is the nth term of sequence T.
2 Recognise patterns in sequences, including the term-to-term rule, and relationships between different sequences.	Includes linear, quadratic, cubic and exponential sequences and simple combinations of these.
3 Find and use the nth term of sequences.	

2 Algebra and graphs (continued)

E2.8 Proportion	Notes and examples
Express direct and inverse proportion in algebraic terms and use this form of expression to find unknown quantities.	Includes linear, square, square root, cube and cube root proportion. Knowledge of proportional symbol ($\propto$) is required.

E2.9 Graphs in practical situations	Notes and examples
1 Use and interpret graphs in practical situations including travel graphs and conversion graphs.	Includes estimation and interpretation of the gradient of a tangent at a point.
2 Draw graphs from given data.	
3 Apply the idea of rate of change to simple kinematics involving distance–time and speed–time graphs, acceleration and deceleration.	
4 Calculate distance travelled as area under a speed–time graph.	Areas will involve linear sections of the graph only.

E2.10 Graphs of functions	Notes and examples
1 Construct tables of values, and draw, recognise and interpret graphs for functions of the following forms: • ax^n (includes sums of no more than three of these) • $ab^x + c$ where $n = -2, -1, -\frac{1}{2}, 0, \frac{1}{2}, 1, 2, 3$; a and c are rational numbers; and b is a positive integer.	Examples include: • $y = x^3 + x - 4$ • $y = 2x + \dfrac{3}{x^2}$ • $y = \frac{1}{4} \times 2^x$.
2 Solve associated equations graphically, including finding and interpreting roots by graphical methods.	e.g. finding the intersection of a line and a curve.
3 Draw and interpret graphs representing exponential growth and decay problems.	

2 Algebra and graphs (continued)

E2.11 Sketching curves	Notes and examples
Recognise, sketch and interpret graphs of the following functions: (a) linear (b) quadratic (c) cubic (d) reciprocal (e) exponential.	Functions will be equivalent to: • $ax + by = c$ • $y = ax^2 + bx + c$ • $y = ax^3 + b$ • $y = ax^3 + bx^2 + cx$ • $y = \frac{a}{x} + b$ • $y = ar^x + b$ where a, b and c are rational numbers and r is a rational, positive number. Knowledge of turning points, roots and symmetry is required. Knowledge of vertical and horizontal asymptotes is required. Finding turning points of quadratics by completing the square is required.

E2.12 Differentiation	Notes and examples
1 Estimate gradients of curves by drawing tangents.	
2 Use the derivatives of functions of the form ax^n, where a is a rational constant and n is a positive integer or zero, and simple sums of not more than three of these.	$\frac{dy}{dx}$ notation will be expected.
3 Apply differentiation to gradients and stationary points (turning points).	
4 Discriminate between maxima and minima by any method.	Maximum and minimum points may be identified by: • an accurate sketch • use of the second differential • inspecting the gradient either side of a turning point. Candidates are **not** expected to identify points of inflection.

2 Algebra and graphs (continued)

E2.13 Functions	Notes and examples
1 Understand functions, domain and range and use function notation.	Examples include: • $\mathrm{f}(x) = 3x - 5$ • $\mathrm{g}(x) = \dfrac{3(x+4)}{5}$ • $\mathrm{h}(x) = 2x^2 + 3$.
2 Understand and find inverse functions $\mathrm{f}^{-1}(x)$.	
3 Form composite functions as defined by $\mathrm{gf}(x) = \mathrm{g}(\mathrm{f}(x))$.	e.g. $\mathrm{f}(x) = \dfrac{3}{x+2}$ and $\mathrm{g}(x) = (3x+5)^2$. Find $\mathrm{fg}(x)$. Give your answer as a fraction in its simplest form. Candidates are **not** expected to find the domains and ranges of composite functions. This topic may include mapping diagrams.

3 Coordinate geometry

E3.1 Coordinates	Notes and examples
Use and interpret Cartesian coordinates in two dimensions.	

E3.2 Drawing linear graphs	Notes and examples
Draw straight-line graphs for linear equations.	Examples include: • $y = -2x + 5$ • $y = 7 - 4x$ • $3x + 2y = 5$.

E3.3 Gradient of linear graphs	Notes and examples
1 Find the gradient of a straight line. 2 Calculate the gradient of a straight line from the coordinates of two points on it.	

E3.4 Length and midpoint	Notes and examples
1 Calculate the length of a line segment. 2 Find the coordinates of the midpoint of a line segment.	

E3.5 Equations of linear graphs	Notes and examples
Interpret and obtain the equation of a straight-line graph.	Questions may: • use and request lines in different forms, e.g. $ax + by = c$ $y = mx + c$ $x = k$ • involve finding the equation when the graph is given • ask for the gradient or y-intercept of a graph from an equation, e.g. find the gradient and y-intercept of the graph with equation $5x + 4y = 8$. Candidates are expected to give equations of a line in a fully simplified form.

3 Coordinate geometry (continued)

E3.6 Parallel lines	Notes and examples
Find the gradient and equation of a straight line parallel to a given line.	e.g. find the equation of the line parallel to $y = 4x - 1$ that passes through $(1, -3)$.

E3.7 Perpendicular lines	Notes and examples
Find the gradient and equation of a straight line perpendicular to a given line.	Examples include: • find the gradient of a line perpendicular to $2y = 3x + 1$ • find the equation of the perpendicular bisector of the line joining the points $(-3, 8)$ and $(9, -2)$.

4 Geometry

E4.1 Geometrical terms	Notes and examples
1 Use and interpret the following geometrical terms: • point • vertex • line • plane • parallel • perpendicular • perpendicular bisector • bearing • right angle • acute, obtuse and reflex angles • interior and exterior angles • similar • congruent • scale factor.	Candidates are **not** expected to show that two shapes are congruent.
2 Use and interpret the vocabulary of: • triangles • special quadrilaterals • polygons • nets • solids.	Includes the following terms. Triangles: • equilateral • isosceles • scalene • right-angled. Quadrilaterals: • square • rectangle • kite • rhombus • parallelogram • trapezium.

continued

4 Geometry (continued)

E4.1 Geometrical terms (continued)	Notes and examples
	Polygons: • regular and irregular polygons • pentagon • hexagon • octagon • decagon. Solids: • cube • cuboid • prism • cylinder • pyramid • cone • sphere • hemisphere • frustum • face • surface • edge.
3 Use and interpret the vocabulary of a circle.	Includes the following terms: • centre • radius (plural radii) • diameter • circumference • semicircle • chord • tangent • major and minor arc • sector • segment.

4 Geometry (continued)

E4.2 Geometrical constructions	Notes and examples
1 Measure and draw lines and angles.	A ruler should be used for all straight edges. Constructions of perpendicular bisectors and angle bisectors are **not** required.
2 Construct a triangle, given the lengths of all sides, using a ruler and pair of compasses only.	e.g. construct a rhombus by drawing two triangles. Construction arcs must be shown.
3 Draw, use and interpret nets.	Examples include: • draw nets of cubes, cuboids, prisms and pyramids • use measurements from nets to calculate volumes and surface areas.

E4.3 Scale drawings	Notes and examples
1 Draw and interpret scale drawings.	A ruler must be used for all straight edges.
2 Use and interpret three-figure bearings.	Bearings are measured clockwise from north (000° to 360°). e.g. find the bearing of A from B if the bearing of B from A is 025°. Includes an understanding of the terms north, east, south and west. e.g. point D is due east of point C.

E4.4 Similarity	Notes and examples
1 Calculate lengths of similar shapes.	
2 Use the relationships between lengths and areas of similar shapes and lengths, surface areas and volumes of similar solids.	Includes use of scale factor, e.g. $\frac{\text{Volume of } A}{\text{Volume of } B} = \frac{(\text{Length of } A)^3}{(\text{Length of } B)^3}$.
3 Solve problems and give simple explanations involving similarity.	Includes showing that two triangles are similar using geometric reasons.

E4.5 Symmetry	Notes and examples
1 Recognise line symmetry and order of rotational symmetry in two dimensions.	Includes properties of triangles, quadrilaterals and polygons directly related to their symmetries.
2 Recognise symmetry properties of prisms, cylinders, pyramids and cones.	e.g. identify planes and axes of symmetry.

4 Geometry (continued)

E4.6 Angles	Notes and examples
1 Calculate unknown angles and give simple explanations using the following geometrical properties: • sum of angles at a point = 360° • sum of angles at a point on a straight line = 180° • vertically opposite angles are equal • angle sum of a triangle = 180° and angle sum of a quadrilateral = 360°.	Knowledge of 3-letter notation for angles is required, e.g. angle ABC. Candidates are expected to use the correct geometrical terminology when giving reasons for answers.
2 Calculate unknown angles and give geometric explanations for angles formed within parallel lines: • corresponding angles are equal • alternate angles are equal • co-interior angles sum to 180° (supplementary).	
3 Know and use angle properties of regular and irregular polygons.	Includes exterior and interior angles, and angle sum.

E4.7 Circle theorems I	Notes and examples
Calculate unknown angles and give explanations using the following geometrical properties of circles: • angle in a semicircle = 90° • angle between tangent and radius = 90° • angle at the centre is twice the angle at the circumference • angles in the same segment are equal • opposite angles of a cyclic quadrilateral sum to 180° (supplementary) • alternate segment theorem.	Candidates are expected to use the geometrical properties listed in the syllabus when giving reasons for answers.

E4.8 Circle theorems II	Notes and examples
Use the following symmetry properties of circles: • equal chords are equidistant from the centre • the perpendicular bisector of a chord passes through the centre • tangents from an external point are equal in length.	Candidates are expected to use the geometrical properties listed in the syllabus when giving reasons for answers.

5 Mensuration

E5.1 Units of measure	Notes and examples
Use metric units of mass, length, area, volume and capacity in practical situations and convert quantities into larger or smaller units.	Units include: • mm, cm, m, km • mm^2, cm^2, m^2, km^2 • mm^3, cm^3, m^3 • ml, l • g, kg. Conversion between units includes: • between different units of area, e.g. $cm^2 \leftrightarrow m^2$ • between units of volume and capacity, e.g. $m^3 \leftrightarrow$ litres.

E5.2 Area and perimeter	Notes and examples
Carry out calculations involving the perimeter and area of a rectangle, triangle, parallelogram and trapezium.	Except for the area of a triangle, formulas are **not** given.

E5.3 Circles, arcs and sectors	Notes and examples
1 Carry out calculations involving the circumference and area of a circle.	Answers may be asked for in terms of π. Formulas are given in the List of formulas.
2 Carry out calculations involving arc length and sector area as fractions of the circumference and area of a circle.	Includes minor and major sectors.

E5.4 Surface area and volume	Notes and examples
Carry out calculations and solve problems involving the surface area and volume of a: • cuboid • prism • cylinder • sphere • pyramid • cone.	Answers may be asked for in terms of π. The following formulas are given in the List of formulas: • curved surface area of a cylinder • curved surface area of a cone • surface area of a sphere • volume of a prism • volume of a pyramid • volume of a cylinder • volume of a cone • volume of a sphere. The term prism refers to any solid with a uniform cross-section, e.g. a cylindrical sector.

5 Mensuration (continued)

E5.5 Compound shapes and parts of shapes	Notes and examples
1 Carry out calculations and solve problems involving perimeters and areas of: • compound shapes • parts of shapes.	Answers may be asked for in terms of π.
2 Carry out calculations and solve problems involving surface areas and volumes of: • compound solids • parts of solids.	e.g. find the surface area and volume of a frustum.

6 Trigonometry

E6.1 Pythagoras' theorem	Notes and examples
Know and use Pythagoras' theorem.	

E6.2 Right-angled triangles	Notes and examples
1 Know and use the sine, cosine and tangent ratios for acute angles in calculations involving sides and angles of a right-angled triangle.	Angles will be given in degrees and answers should be written in degrees, with decimals correct to one decimal place.
2 Solve problems in two dimensions using Pythagoras' theorem and trigonometry.	Knowledge of bearings may be required.
3 Know that the perpendicular distance from a point to a line is the shortest distance to the line.	
4 Carry out calculations involving angles of elevation and depression.	

E6.3 Exact trigonometric values	Notes and examples
Know the exact values of: 1 $\sin x$ and $\cos x$ for $x = 0°, 30°, 45°, 60°$ and $90°$. 2 $\tan x$ for $x = 0°, 30°, 45°$ and $60°$.	

E6.4 Trigonometric functions	Notes and examples
1 Recognise, sketch and interpret the following graphs for $0° \leqslant x \leqslant 360°$: • $y = \sin x$ • $y = \cos x$ • $y = \tan x$.	
2 Solve trigonometric equations involving $\sin x$, $\cos x$ or $\tan x$, for $0° \leqslant x \leqslant 360°$.	e.g. solve: • $\sin x = \frac{\sqrt{3}}{2}$ for $0° \leqslant x \leqslant 360°$ • $2\cos x + 1 = 0$ for $0° \leqslant x \leqslant 360°$.

6 Trigonometry (continued)

E6.5 Non-right-angled triangles	Notes and examples
1 Use the sine and cosine rules in calculations involving lengths and angles for any triangle.	Includes problems involving obtuse angles and the ambiguous case.
2 Use the formula area of triangle $= \frac{1}{2}ab\sin C$.	The sine and cosine rules and the formula for area of a triangle are given in the List of formulas.

E6.6 Pythagoras' theorem and trigonometry in 3D	Notes and examples
Carry out calculations and solve problems in three dimensions using Pythagoras' theorem and trigonometry, including calculating the angle between a line and a plane.	

7 Transformations and vectors

E7.1 Transformations	Notes and examples
Recognise, describe and draw the following transformations: 1 Reflection of a shape in a straight line. 2 Rotation of a shape about a centre through multiples of 90°.	Questions may involve combinations of transformations. A ruler must be used for all straight edges.
3 Enlargement of a shape from a centre by a scale factor. 4 Translation of a shape by a vector $\begin{pmatrix} x \\ y \end{pmatrix}$.	Positive, fractional and negative scale factors may be used.

E7.2 Vectors in two dimensions	Notes and examples
1 Describe a translation using a vector represented by $\begin{pmatrix} x \\ y \end{pmatrix}$, $\overrightarrow{AB}$ or $\mathbf{a}$. 2 Add and subtract vectors. 3 Multiply a vector by a scalar.	Vectors will be printed as $\overrightarrow{AB}$ or $\mathbf{a}$.

E7.3 Magnitude of a vector	Notes and examples
Calculate the magnitude of a vector $\begin{pmatrix} x \\ y \end{pmatrix}$ as $\sqrt{x^2+y^2}$.	The magnitudes of vectors will be denoted by modulus signs, e.g. • $\lvert\mathbf{a}\rvert$ is the magnitude of $\mathbf{a}$ • $\lvert\overrightarrow{AB}\rvert$ is the magnitude of $\overrightarrow{AB}$.

E7.4 Vector geometry	Notes and examples
1 Represent vectors by directed line segments. 2 Use position vectors. 3 Use the sum and difference of two or more vectors to express given vectors in terms of two coplanar vectors.	
4 Use vectors to reason and to solve geometric problems.	Examples include: • show that vectors are parallel • show that 3 points are collinear • solve vector problems involving ratio and similarity.

8 Probability

E8.1 Introduction to probability	Notes and examples
1 Understand and use the probability scale from 0 to 1. 2 Understand and use probability notation.	$\mathrm{P}(A)$ is the probability of A $\mathrm{P}(A')$ is the probability of not A
3 Calculate the probability of a single event.	Probabilities should be given as a fraction, decimal or percentage. Problems may require using information from tables, graphs or Venn diagrams.
4 Understand that the probability of an event not occurring = 1 – the probability of the event occurring.	e.g. $\mathrm{P}(B) = 0.8$, find $\mathrm{P}(B')$

E8.2 Relative and expected frequencies	Notes and examples
1 Understand relative frequency as an estimate of probability.	e.g. use results of experiments with a spinner to estimate the probability of a given outcome.
2 Calculate expected frequencies.	e.g. use probability to estimate an expected value from a population. Includes understanding what is meant by fair, bias and random.

E8.3 Probability of combined events	Notes and examples
Calculate the probability of combined events using, where appropriate:	Combined events could be with or without replacement.
• sample space diagrams	
• Venn diagrams	The notation $\mathrm{P}(A \cap B)$ and $\mathrm{P}(A \cup B)$ may be used in the context of Venn diagrams.
• tree diagrams.	On tree diagrams outcomes will be written at the end of branches and probabilities by the side of the branches.

E8.4 Conditional probability	Notes and examples
Calculate conditional probability using Venn diagrams, tree diagrams and tables.	Knowledge of notation, $\mathrm{P}(A\mid B)$, and formulas relating to conditional probability is **not** required.

9 Statistics

E9.1 Classifying statistical data	Notes and examples
Classify and tabulate statistical data.	e.g. tally tables, two-way tables.

E9.2 Interpreting statistical data	Notes and examples
1 Read, interpret and draw inferences from tables and statistical diagrams.	
2 Compare sets of data using tables, graphs and statistical measures.	e.g. compare averages and measures of spread between two data sets.
3 Appreciate restrictions on drawing conclusions from given data.	

E9.3 Averages and measures of spread	Notes and examples
1 Calculate the mean, median, mode, quartiles, range and interquartile range for individual data and distinguish between the purposes for which these are used.	
2 Calculate an estimate of the mean for grouped discrete or grouped continuous data.	
3 Identify the modal class from a grouped frequency distribution.	

E9.4 Statistical charts and diagrams	Notes and examples
Draw and interpret:	
(a) bar charts	Includes composite (stacked) and dual (side-by-side) bar charts.
(b) pie charts	
(c) pictograms	
(d) stem-and-leaf diagrams	Stem-and-leaf diagrams should have ordered data with a key.
(e) simple frequency distributions.	

9 Statistics (continued)

E9.5 Scatter diagrams	Notes and examples
1 Draw and interpret scatter diagrams.	Plotted points should be clearly marked, for example as small crosses (×).
2 Understand what is meant by positive, negative and zero correlation.	
3 Draw by eye, interpret and use a straight line of best fit.	A line of best fit: • should be a single ruled line drawn by inspection • should extend across the full data set • does not need to coincide exactly with any of the points but there should be a roughly even distribution of points either side of the line over its entire length.

E9.6 Cumulative frequency diagrams	Notes and examples
1 Draw and interpret cumulative frequency tables and diagrams.	Plotted points on a cumulative frequency diagram should be clearly marked, for example as small crosses (×), and be joined with a smooth curve.
2 Estimate and interpret the median, percentiles, quartiles and interquartile range from cumulative frequency diagrams.	

E9.7 Histograms	Notes and examples
1 Draw and interpret histograms. 2 Calculate with frequency density.	On histograms, the vertical axis is labelled 'Frequency density'. Frequency density is defined as $\text{frequency density} = \text{frequency} \div \text{class width}$.

4 Details of the assessment

All candidates take **two** components.

Candidates who have studied the Core subject content, or who are expected to achieve a grade D or below, should be entered for Paper 1 and Paper 3. These candidates will be eligible for grades C to G.

Candidates who have studied the Extended subject content and who are expected to achieve a grade C or above should be entered for Paper 2 and Paper 4. These candidates will be eligible for grades A* to E.

All papers assess AO1 Knowledge and understanding of mathematical techniques and AO2 Analyse, interpret and communicate mathematically.

All papers consist of structured and unstructured questions. Structured questions contain parts, e.g. (a), (b), (c)(i), etc., and unstructured questions do not.

Questions may assess more than one topic from the subject content.

For all papers, candidates write their answers on the question paper. They must show all necessary working in the spaces provided.

Additional materials for exams

For both Core and Extended papers, candidates should have the following geometrical instruments:

- a pair of compasses
- a protractor
- a ruler.

Tracing paper may be used as an additional material for all four papers. Candidates cannot bring their own tracing paper but may request it during the examination.

Candidates should have a scientific calculator for Papers 3 and 4; one with trigonometric functions is strongly recommended. Algebraic or graphical calculators are **not** permitted. Please see the *Cambridge Handbook* at **www.cambridgeinternational.org/eoguide** for guidance on use of calculators in the examinations. Calculators are **not** allowed for Paper 1 and Paper 2.

The Additional materials list for exams is updated before each series. You can view the list for the relevant series and year on our website in the Phase 4 – Before the exams section of the *Cambridge Exams Officer's Guide* at **www.cambridgeinternational.org/eoguide**

Core assessment

Paper 1 Non-calculator (Core)

Written paper, 1 hour 30 minutes, 80 marks

Use of a calculator is **not** allowed.

Candidates answer **all** questions.

This paper consists of questions based on the Core subject content, except for C1.14 Using a calculator.

This paper will be weighted at 50% of the total qualification.

This is a compulsory component for Core candidates.

This written paper is an externally set assessment, marked by Cambridge.

Paper 3 Calculator (Core)

Written paper, 1 hour 30 minutes, 80 marks

A scientific calculator is required.

Candidates answer **all** questions.

This paper consists of questions based on the Core subject content.

Candidates should give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

To earn accuracy marks, candidates should avoid rounding figures until they have their final answer. Where candidates need to use a final answer in later parts of the question, they should use the value of the final answer **before** it was rounded.

Candidates should use the value of π from their calculator or the value of 3.142.

This paper will be weighted at 50% of the total qualification.

This is a compulsory component for Core candidates.

This written paper is an externally set assessment, marked by Cambridge.

Extended assessment

Paper 2 Non-calculator (Extended)

Written paper, 2 hours, 100 marks

Use of a calculator is **not** allowed.

Candidates answer **all** questions.

This paper consists of questions based on the Extended subject content, except for E1.14 Using a calculator.

This paper will be weighted at 50% of the total qualification.

This is a compulsory component for Extended candidates.

This written paper is an externally set assessment, marked by Cambridge.

Paper 4 Calculator (Extended)

Written paper, 2 hours, 100 marks

A scientific calculator is required.

Candidates answer **all** questions.

This paper consists of questions based on the Extended subject content.

Candidates should give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

To earn accuracy marks, candidates should avoid rounding figures until they have their final answer. Where candidates need to use a final answer in later parts of the question, they should use the value of the final answer **before** it was rounded.

Candidates should use the value of π from their calculator or the value of 3.142.

This paper will be weighted at 50% of the total qualification.

This is a compulsory component for Extended candidates.

This written paper is an externally set assessment, marked by Cambridge.

List of formulas – Core (Paper 1 and Paper 3)

This list of formulas will be included on page 2 of Paper 1 and Paper 3.

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle of radius r.	$A = \pi r^2$
Circumference, C, of circle of 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.	$A = \pi rl$
Surface area, A, of sphere of 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.	$V = \frac{1}{3}Ah$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of cone of radius r, height h.	$V = \frac{1}{3}\pi r^2 h$
Volume, V, of sphere of radius r.	$V = \frac{4}{3}\pi r^3$

List of formulas – Extended (Paper 2 and Paper 4)

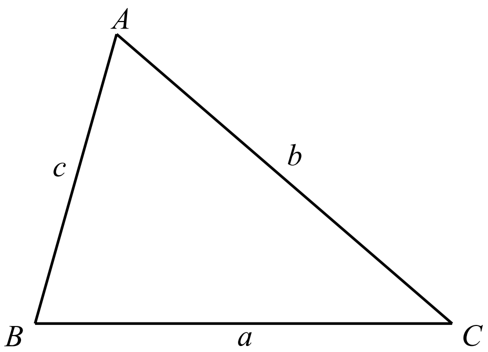
This list of formulas will be included on page 2 of Paper 2 and Paper 4.

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle of radius r.	$A = \pi r^2$
Circumference, C, of circle of 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.	$A = \pi rl$
Surface area, A, of sphere of 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.	$V = \frac{1}{3}Ah$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of cone of radius r, height h.	$V = \frac{1}{3}\pi r^2 h$
Volume, V, of sphere of radius r.	$V = \frac{4}{3}\pi r^3$

For the equation $ax^2 + bx + c = 0$, where $a \neq 0$

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

For the triangle shown,



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

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

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

Mathematical conventions

Mathematics is a universal language where there are some similarities and differences around the world. The guidance below outlines the conventions used in Cambridge examinations and we encourage candidates to follow these conventions.

Working with graphs

- A **plot** of a graph should have points clearly marked, for example as small crosses (×), and **must**:
  - be drawn on graph or squared paper
  - cover a given range of values by calculating the coordinates of points and connecting them appropriately (where values are given, it will include enough points to determine a curve; where a table of values is not provided, the candidate must decide on the appropriate number of points required to determine the curve)
  - have each point plotted to an accuracy of within half of the smallest square on the grid.
- A **sketch** of a graph does not have to be accurate or to scale, nor does it need to be on graph or squared paper, but it **must**:
  - be drawn freehand
  - show the most important features, e.g. x-intercepts, y-intercepts, turning points, symmetry, with coordinates or values marked on the axes, where appropriate
  - have labelled axes, e.g. with x and y
  - interact with the axes appropriately, e.g. by intersecting or by tending towards
  - fall within the correct quadrants
  - show the correct long-term behaviour.
- Graphs should extend as far as possible across any given grid, within any constraints of the domain.
- Where graphs of functions are:
  - linear, they should be ruled
  - non-linear, the points should be joined with a smooth curve.
- A tangent to a curve should touch the curve at the required point and be in contact with the curve for the minimum possible distance. It should not cross the curve at the point where it is a tangent.
- Values should be read off a graph to an accuracy of within half of the smallest square on the grid.

Communicating mathematically

- If candidates are asked to show their working, they cannot gain full marks without clearly communicating their method, even if their final answer is correct.
- A numerical answer should not be given as a combination of fractions and decimals, e.g. $\frac{1}{0.2}$ is **not** acceptable.

Accuracy

- Answers are expected to be given in their simplest form unless the question states otherwise.
- Where a question asks for 'exact values' the answer may need to be given in terms of π or in surd form, depending on the question.
- Where answers are not exact values, they should be given to three significant figures unless a different accuracy is defined in the question.
- Answers that are exact to four or five significant figures should **not** be rounded unless the question states otherwise.
- In order to obtain an answer correct to an appropriate degree of accuracy, a higher degree of accuracy will often be needed within the working.
- If a question asks to prove or show a given answer to a specified degree of accuracy, candidates must show full working, intermediate answers and the final answer to at least one degree of accuracy more than that asked for.

Command words

Command words and their meanings help candidates know what is expected from them in the exams. The table below includes command words used in the assessment for this syllabus. The use of the command word will relate to the subject context.

Command word	What it means
Calculate	work out from given facts, figures or information
Construct	make an accurate drawing
Determine	establish with certainty
Describe	state the points of a topic / give characteristics and main features
Explain	set out purposes or reasons / make the relationships between things clear / say why and/or how and support with relevant evidence
Give	produce an answer from a given source or recall/memory
Plot	mark point(s) on a graph
Show (that)	provide structured evidence that leads to a given result
Sketch	make a simple freehand drawing showing the key features
State	express in clear terms
Work out	calculate from given facts, figures or information with or without the use of a calculator
Write	give an answer in a specific form
Write down	give an answer without significant working

5 What else you need to know

This section is an overview of other information you need to know about this syllabus. It will help to share the administrative information with your exams officer so they know when you will need their support. Find more information about our administrative processes at **www.cambridgeinternational.org/eoguide**

Before you start

Previous study

We recommend that learners starting this course should have studied a mathematics curriculum such as the Cambridge Lower Secondary programme or equivalent national educational framework.

Guided learning hours

We design Cambridge IGCSE syllabuses to require about 130 guided learning hours for each subject. This is for guidance only. The number of hours a learner needs to achieve the qualification may vary according to each school and the learners' previous experience of the subject.

Availability and timetables

All Cambridge schools are allocated to one of six administrative zones. Each zone has a specific timetable.

You can view the timetable for your administrative zone at **www.cambridgeinternational.org/timetables**

You can enter candidates in the June and November exam series. If your school is in India, you can also enter your candidates in the March exam series.

Check you are using the syllabus for the year the candidate is taking the exam.

Private candidates can enter for this syllabus. For more information, please refer to the *Cambridge Guide to Making Entries*.

Combining with other syllabuses

Candidates can take this syllabus alongside other Cambridge International syllabuses in a single exam series. The only exceptions are:

- Cambridge IGCSE (9–1) Mathematics (0980)
- Cambridge IGCSE International Mathematics (0607)
- Cambridge O Level Mathematics (4024)
- syllabuses with the same title at the same level.

Cambridge IGCSE, Cambridge IGCSE (9–1) and Cambridge O Level syllabuses are at the same level.

Group awards: Cambridge ICE

Cambridge ICE (International Certificate of Education) is a group award for Cambridge IGCSE. It allows schools to offer a broad and balanced curriculum by recognising the achievements of learners who pass exams in a range of different subjects.

Learn more about Cambridge ICE at **www.cambridgeinternational.org/cambridgeice**

Making entries

Exams officers are responsible for submitting entries to Cambridge International. We encourage them to work closely with you to make sure they enter the right number of candidates for the right combination of syllabus components. Entry option codes and instructions for submitting entries are in the *Cambridge Guide to Making Entries*. Your exams officer has a copy of this guide.

Exam administration

To keep our exams secure, we produce question papers for different areas of the world, known as administrative zones. We allocate all Cambridge schools to an administrative zone determined by their location. Each zone has a specific timetable. Some of our syllabuses offer candidates different assessment options. An entry option code is used to identify the components the candidate will take relevant to the administrative zone and the available assessment options.

Support for exams officers

We know how important exams officers are to the successful running of exams. We provide them with the support they need to make your entries on time. Your exams officer will find this support, and guidance for all other phases of the Cambridge Exams Cycle, at **www.cambridgeinternational.org/eoguide**

Retakes

Candidates can retake the whole qualification as many times as they want to. Information on retake entries is at **www.cambridgeinternational.org/retakes**

Language

This syllabus and the related assessment materials are available in English only.

Accessibility and equality

Syllabus and assessment design

Cambridge International works to avoid direct or indirect discrimination. We develop and design syllabuses and assessment materials to maximise inclusivity for candidates of all national, cultural or social backgrounds and candidates with protected characteristics; these protected characteristics include special educational needs and disability, religion and belief, and characteristics related to gender and identity. In addition, the language and layout used are designed to make our materials as accessible as possible. This gives all candidates the fairest possible opportunity to demonstrate their knowledge, skills and understanding and helps to minimise the requirement to make reasonable adjustments during the assessment process.

Access arrangements

Access arrangements (including modified papers) are the principal way in which Cambridge International complies with our duty, as guided by the UK Equality Act (2010), to make ‘reasonable adjustments’ for candidates with special educational needs (SEN), disability, illness or injury. Where a candidate would otherwise be at a substantial disadvantage in comparison to a candidate with no SEN, disability, illness or injury, we may be able to agree pre-examination access arrangements. These arrangements help a candidate by minimising accessibility barriers and maximising their opportunity to demonstrate their knowledge, skills and understanding in an assessment.

Important:

- Requested access arrangements should be based on evidence of the candidate's barrier to assessment and should also reflect their normal way of working at school; this is in line with the *Cambridge Handbook* **www.cambridgeinternational.org/eoguide**
- For Cambridge International to approve an access arrangement, we will need to agree that it constitutes a reasonable adjustment, involves reasonable cost and timeframe and does not affect the security and integrity of the assessment.
- Availability of access arrangements should be checked by centres at the start of the course. Details of our standard access arrangements and modified question papers are available in the *Cambridge Handbook* **www.cambridgeinternational.org/eoguide**
- Please contact us at the start of the course to find out if we are able to approve an arrangement that is not included in the list of standard access arrangements.
- Candidates who cannot access parts of the assessment may be able to receive an award based on the parts they have completed.

After the exam

Grading and reporting

Grades A*, A, B, C, D, E, F or G indicate the standard a candidate achieved at Cambridge IGCSE.

A* is the highest and G is the lowest. 'Ungraded' means that the candidate's performance did not meet the standard required for grade G. 'Ungraded' is reported on the statement of results but not on the certificate.

In specific circumstances your candidates may see one of the following letters on their statement of results:

- Q (PENDING)
- X (NO RESULT).

These letters do not appear on the certificate.

On the statement of results and certificates, Cambridge IGCSE is shown as INTERNATIONAL GENERAL CERTIFICATE OF SECONDARY EDUCATION (IGCSE).

How students and teachers can use the grades

Assessment at Cambridge IGCSE has two purposes:

1. to measure learning and achievement

   The assessment confirms achievement and performance in relation to the knowledge, understanding and skills specified in the syllabus, to the levels described in the grade descriptions.

2. to show likely future success

   The outcomes help predict which students are well prepared for a particular course or career and/or which students are more likely to be successful.

   The outcomes help students choose the most suitable course or career.

Grade descriptions

Grade descriptions are provided to give an indication of the standards of achievement candidates awarded particular grades are likely to show. Weakness in one aspect of the examination may be balanced by a better performance in some other aspect.

Grade descriptions for Cambridge IGCSE Mathematics will be published after the first assessment of the syllabus in 2025.

Changes to this syllabus for 2025, 2026 and 2027

This syllabus is version 3, published May 2024.

You must read the whole syllabus before planning your teaching programme.

Changes to version 3 of the syllabus, published May 2024.

Changes to syllabus content	• Alignment of text on pages 41–56 has been adjusted.

Changes to version 2 of the syllabus, published February 2024.

Changes to syllabus content	• The term prism has been clarified in C5.4 and E5.4 in the notes and guidance. • Drawing graphs in E2.11 has been clarified to define the expectations for reciprocal and exponential graphs. • Guidance has been updated to include the term random in C8.2.2 and E8.2.2

Changes to version 1 of the syllabus, published September 2022.

Changes to syllabus content	• The wording of the learning outcomes has been updated and additional notes and examples included, to clarify the depth of teaching. • The subject content has been refreshed and updated, with some topics and learning outcomes added and some removed. Significant changes to content have been summarised below. • No new topics have been added to the Core subject content. • Content removed from the Core subject content: – adding and subtracting vectors – multiplying a vector by a scalar – data collection (it is expected that data collection will be part of a course based on this syllabus, although it will not be assessed in an examination). • Content added to the Core subject content: – inequalities – recall of certain squares, cubes and roots *continued*

Changes to syllabus content (continued)	• Content removed from the Extended subject content: – proper subsets – linear programming – congruence criteria (knowledge of congruence itself is still in the syllabus) – data collection (it is expected that data collection will be part of a course based on this syllabus, although it will not be assessed in an examination) – box-and-whisker plots • Content added to the Extended subject content: – recall of certain squares, cubes and roots – surds – graphs of functions in the form ax^n now include values of n of $-\frac{1}{2}$ and $\frac{1}{2}$ – domain and range – exact trigonometric values • Other content has been clarified within topics; you are advised to read the subject content in the syllabus carefully for details. • The teaching time has not changed. • The Details of the assessment section includes: – the List of formulas that is provided in the examinations – mathematical conventions. • The wording of the learner attributes has been updated to improve the clarity of wording. • The wording of the aims has been updated to improve the clarity of wording but the meaning is the same. • The wording of the assessment objectives (AOs) has been updated. There are no changes to the knowledge and skills being assessed for each AO.

Changes to assessment (including changes to specimen papers)	• A non-calculator assessment has been introduced at each tier to build candidates' confidence in working mathematically without a calculator. • The examination papers have been rebalanced to provide improved accessibility and a better candidate experience. The marks, durations and weightings are the same for both papers in a tier. • All examination papers will: – include the List of formulas on page 2 – include a mixture of structured and unstructured questions – have questions that are the same standard as in the existing assessment. • Changes to Paper 1 (Core) – this is now a non-calculator paper, calculators are **not** allowed in the exam – number of marks increased to 80 marks – duration has changed to 1 hour 30 minutes – weighting has changed to 50% • Changes to Paper 2 (Extended) – this is now a non-calculator paper, calculators are **not** allowed in the exam – number of marks increased to 100 marks – duration has changed to 2 hours – weighting has changed to 50% • Changes to Paper 3 (Core) – number of marks decreased to 80 marks – duration has changed to 1 hour 30 minutes – weighting has changed to 50% • Calculators are still allowed in Paper 3. • Changes to Paper 4 (Extended) – number of marks decreased to 100 marks – duration has changed to 2 hours – weighting has changed to 50% • Calculators are still allowed in Paper 4. • The specimen assessment materials have been updated to reflect the changes to the assessment.

In addition to reading the syllabus, you should refer to the updated specimen assessment materials. The specimen papers will help your students become familiar with exam requirements and command words in questions. The specimen mark schemes show how students should answer questions to meet the assessment objectives.

Any textbooks endorsed to support the syllabus for examination from 2025 are suitable for use with this syllabus.

School feedback: 'While studying Cambridge IGCSE and Cambridge International A Levels, students broaden their horizons through a global perspective and develop a lasting passion for learning.'

Feedback from: Zhai Xiaoning, Deputy Principal, The High School Affiliated to Renmin University of China

We are committed to making our documents accessible in accordance with the WCAG 2.1 Standard. We are always looking to improve the accessibility of our documents. If you find any problems or you think we are not meeting accessibility requirements, contact us at **info@cambridgeinternational.org** with the subject heading: Digital accessibility. If you need this document in a different format, contact us and supply your name, email address and requirements and we will respond within 15 working days.

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