

GCSE (9-1)

Specification

MATHEMATICS

J560

For first assessment in 2017

Disclaimer

Specifications are updated over time. Whilst every effort is made to check all documents, there may be contradictions between published resources and the specification, therefore please use the information on the latest specification at all times. Where changes are made to specifications these will be indicated within the document, there will be a new version number indicated, and a summary of the changes. If you do notice a discrepancy between the specification and a resource please contact us at: resources.feedback@ocr.org.uk

We will inform centres about changes to specifications. We will also publish changes on our website. The latest version of our specifications will always be those on our website (ocr.org.uk) and these may differ from printed versions.

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Introducing...

GCSE (9–1) Mathematics (from September 2015)

We've developed an inspiring, motivating and coherent mathematics specification for the entire ability range. It emphasises and encourages:

- Sound understanding of concepts
- Fluency in procedural skill
- Competency to apply mathematical skills in a range of contexts
- Confidence in mathematical problem solving.

Meet the team

We have a dedicated team of Mathematics Subject Advisors working on our mathematics qualifications.

Find out more about our mathematics qualifications and support at ocr.org.uk/maths

If you need specialist advice, guidance or support, get in touch:

01223 553998

maths@ocr.org.uk

[@OCR_Maths](https://twitter.com/OCR_Maths)

Teaching and learning resources

We recognise that the introduction of a new specification can bring challenges for implementation and teaching. Our aim is to assist you at every stage. We have worked hard in close consultation with teachers and other subject experts to provide a practical package of support to help you to make the move to OCR GCSE (9-1) Maths.

Designed to support progression for all

Our resources are designed to provide you with a range of teaching activities and suggestions so you can select the best approach for your particular students. You are the experts on how your students learn and our aim is to support you in the best way we can.

We want to...

- Support you with a body of knowledge that grows throughout the lifetime of the specification
- Provide you with a range of suggestions so you can select the best activity, approach or context for your particular students
- Make it easier for you to explore and interact with our resource materials, in particular to develop your own schemes of work
- Create an ongoing conversation so we can develop materials that work for you.

Plenty of useful resources

You'll have four main types of subject-specific teaching and learning resources at your fingertips:

- Delivery Guides
- Transition Guides
- Topic Exploration Packs
- Lesson Elements.

Along with subject-specific resources, you'll also have access to a selection of generic resources that focus on skills development and professional guidance for teachers.

Skills Guides – we've produced a set of Skills Guides that are not specific to Mathematics, but each covers a topic that could be relevant to a range of qualifications – for example, communication, legislation and research. Download the guides at ocr.org.uk/qualifications/skills-guides/

Active Results – a free online results analysis service to help you review the performance of individual students or your whole school. It provides access to detailed results data, enabling more comprehensive analysis of results in order to give you a more accurate measurement of the achievements of your centre and individual students. For more details refer to ocr.org.uk/activeresults

Professional Development

Take advantage of our improved Professional Development webpages, designed with you in mind. Whether you want to come to events, look at our new digital training or search for training materials, you can find what you're looking for all in one place on our Professional Development webpages.

We run regular sessions introducing OCR GCSE (9-1) Mathematics qualification, as well as sessions on marking or giving you feedback on student exam performance.

These events are designed to help support you at every stage, from making the move to OCR through to preparing for assessment.

Visit ocr.org.uk/gcsemathscpd for details and booking of upcoming training, or to find materials from previous courses.

To receive the latest information about the training we offer, please register for GCSE email updates at ocr.org.uk/updates.

1 Why choose an OCR GCSE (9–1) in Mathematics?

1a. Why choose an OCR qualification?

Choose OCR and you've got the reassurance that you're working with one of the UK's leading exam boards. Our GCSE (9–1) in Mathematics course has been developed in consultation with teachers, employers and Higher Education to provide students with a qualification that's relevant to them and meets their needs.

We're part of the Cambridge Assessment Group, Europe's largest assessment agency and a department of the University of Cambridge. Cambridge Assessment plays a leading role in developing and delivering assessments throughout the world, operating in over 150 countries.

We work with a range of education providers, including schools, colleges, workplaces and other institutions in both the public and private sectors. Over 13,000 centres choose our A levels, GCSEs and vocational qualifications including Cambridge Nationals and Cambridge Technicals.

Our Specifications

We believe in developing specifications that help you bring the subject to life and inspire your students to achieve more.

We've created teacher-friendly specifications based on extensive research and engagement with the teaching community. They're designed to be straightforward and accessible so that you can tailor the delivery of the course to suit your needs. We aim to encourage learners to become responsible for their own learning, confident in discussing ideas, innovative and engaged.

We provide a range of support services designed to help you at every stage, from preparation through to the delivery of our specifications. This includes:

- A wide range of high-quality creative resources including:
 - Delivery Guides
 - Transition Guides
 - Topic Exploration Packs
 - Lesson Elements
 - ...and much more.
ocr.org.uk/gcsemaths
- Access to Subject Advisors to support you through the transition and throughout the lifetimes of the specifications.
ocr.org.uk/gcsemaths
- CPD/Training for teachers to introduce the qualifications and prepare you for first teaching.
ocr.org.uk/gcsemathscpd
- Active Results – our free results analysis service helps you review the performance of individual students or across your whole school.
ocr.org.uk/activeresults
- ExamBuilder – our free online past papers service that enables you to build your own test papers from past OCR exam questions.
ocr.org.uk/exambuilder

All GCSE (9–1) qualifications offered by OCR are accredited by Ofqual, the Regulator for qualifications offered in England. The QN for this qualification is QN 601/4606/0.

1b. Why choose an OCR GCSE (9–1) in Mathematics?

OCR's GCSE (9–1) in Mathematics provides a broad, coherent, satisfying and worthwhile course of study. It encourages learners to develop confidence in, and a positive attitude towards mathematics and to recognise the importance of mathematics in their own lives and to society. It also provides a strong mathematical foundation for learners who go on to study mathematics at a higher level, post-16.

Aims and learning outcomes

OCR's GCSE (9–1) in Mathematics enables learners to:

- develop fluent knowledge, skills and understanding of mathematical methods and concepts
- acquire, select and apply mathematical techniques to solve problems
- reason mathematically, make deductions and inferences and draw conclusions
- comprehend, interpret and communicate mathematical information in a variety of forms appropriate to the information and context.

OCR's GCSE (9–1) in Mathematics is:

Worthwhile

- Research, international comparisons and engagement with both teachers and the wider education community have been used to enhance the reliability, validity and appeal of our assessment tasks in mathematics.
- It will encourage the teaching of interesting mathematics, aiming for mastery leading to positive exam results.

Learner-focused

- OCR's specification and assessment will consist of mathematics fit for the modern world and presented in authentic contexts.
- It will allow learners to develop mathematical independence built on a sound base of conceptual learning and understanding.
- OCR will target support and resources to develop fluency, reasoning and problem solving skills.
- It will be a springboard for future progress and achievement in a variety of qualifications across subjects along with employment.

Teacher-centred

- OCR will provide an extensive teacher support package, including high-quality flexible resources, particularly for the new GCSE (9–1) subject areas and assessment objectives.
- OCR's support and resources will focus on empowering teachers, exploring teaching methods and classroom innovation alongside more direct content-based resources.
- OCR's assessment will be solid and dependable, recognising positive achievement in candidate learning and ability.

Dependable

- OCR's high-quality assessments are backed up by sound educational principles and a belief that the utility, richness and power of mathematics should be made evident and accessible to all learners.
- An emphasis on learning and understanding mathematical concepts underpinned by a sound, reliable and valid assessment.

1c. What are the key features of this specification?

- A simple assessment model, featuring 3 papers at each tier, of equal length with identical mark allocations and identical weightings of Assessment Objectives and subject content.
- A specification developed by teachers specifically for teachers, laying out the required content clearly in terms of both topic area and difficulty, facilitating learners' progression through the content.
- An exciting package of free resources, developed in conjunction with teachers and through research by Cambridge Assessment, taking learners from Key Stage 3 right the way through GCSE, which can be adapted as required by teachers and shaped to their learners' needs.
- A flexible support package for teachers formed through listening to teachers' needs, allowing teachers to easily understand the requirements of the qualification and present the qualification to learners.
- A team of OCR Subject Advisors, who centres can contact for subject and assessment queries.
- Part of a wide range of OCR mathematics assessments, allowing progression into a range of further qualifications, from A and AS Level Mathematics and Further Mathematics to Free Standing Mathematics Qualifications, Core Maths, Level 3 certificates and more.
- A mock exams package to assess the progression of learners and easily pick up on topics requiring further teaching.

1d. How do I find out more information?

If you are not already a registered OCR centre, contact us at ocr.org.uk/qualifications/expression-of-interest to find out more information on the benefits of becoming one.

If you are a registered centre, get in touch with our team of Maths Subject Advisors to find out more.

Email: maths@ocr.org.uk

Customer Contact Centre: 01223 553998

Twitter: [@OCR_Maths](https://twitter.com/OCR_Maths)

2 The specification overview

2a. OCR's GCSE (9–1) in Mathematics (J560)

Learners are entered for either Foundation tier (Paper 1, Paper 2 and Paper 3) or Higher tier (Paper 4, Paper 5 and Paper 6).

| Qualification Overview | Assessment Overview | |
|--|--|---|
| <p>Foundation tier, grades 5 to 1</p> <ul style="list-style-type: none"> Paper 1 (Foundation tier) J560/01 Paper 2 (Foundation tier) J560/02 Paper 3 (Foundation tier) J560/03 | <p>Written paper 100 marks 1 hour 30 minutes Calculator permitted</p> | <p>33$\frac{1}{3}$% of total GCSE</p> |
| <p>Higher tier, grades 9 to 4</p> <ul style="list-style-type: none"> Paper 4 (Higher tier) J560/04 Paper 5 (Higher tier) J560/05 Paper 6 (Higher tier) J560/06 | <p>Written paper 100 marks 1 hour 30 minutes Calculator not permitted</p> | <p>33$\frac{1}{3}$% of total GCSE</p> |
| | <p>Written paper 100 marks 1 hour 30 minutes Calculator permitted</p> | <p>33$\frac{1}{3}$% of total GCSE</p> |
| | <p>Written paper 100 marks 1 hour 30 minutes Calculator permitted</p> | <p>33$\frac{1}{3}$% of total GCSE</p> |
| <p>Written paper 100 marks 1 hour 30 minutes Calculator not permitted</p> | <p>33$\frac{1}{3}$% of total GCSE</p> | |
| <p>Written paper 100 marks 1 hour 30 minutes Calculator permitted</p> | <p>33$\frac{1}{3}$% of total GCSE</p> | |

2b. Content of GCSE (9–1) in Mathematics (J560)

The content of this specification.

- This is a linear qualification. The content is arranged by topic area and exemplifies the level of demand for different tiers, but centres are free to teach the content for the appropriate tier in the order most appropriate to their learners' needs.
- Any topic area may be assessed on any component, as relevant at that tier.
- The content of this specification is presented in three columns, representing a progression within the content strands.
- The columns are cumulative so that the expectation of a Foundation tier learner is exemplified by the first two columns and that of a Higher tier learner is the sum of the statements in all three columns.
- Many higher tier learners will already be confident and competent with the content of the first column when they begin their GCSE (9–1) course. It may therefore not be necessary to cover this content explicitly with all learners, though all learners will be assessed on this content at an appropriate level of demand.
- Learners should build on all of the content from earlier key stages. Knowledge of the content of Key Stages 1 and 2 is therefore assumed, but will not be assessed directly.

The division of content into three columns is intended to give an indication of the progression in conceptual and procedural difficulty in each content strand.

This structure:

- helps teachers to target teaching appropriately
- promotes assessment for learning by presenting the content as a progression not simply the end point
- allows teachers to start this GCSE (9–1) course at a level which is appropriate to their learners, without feeling that they have to spend time on content with which their learners are familiar

- allows for easier movement from Foundation tier to Higher tier by showing how the required content for the former progresses to the latter

All exemplars contained in the specification are for illustration only and do not constitute an exhaustive list.

Where content in one column is not further exemplified in the column(s) to its right, that content may be assessed at a higher level of demand than given, as appropriate for learners attaining a higher grade. The expectation is that themes will be developed further and connections explored even when not explicitly stated.

Formulae

The assessment for this specification will not include a formula sheet. All formulae which learners are required to know are given in the specification under 6.02d.

All other formulae required will be given in the assessment.

Units and measures

Learners should be familiar with and calculate with appropriate units: 24-hour and 12-hour clock; seconds (s), minutes (min), hours (h), days, months and years including the relation between consecutive units (1 year = 365 days); £ and pence; \$ and cents; € and cents; degrees; standard units of mass, length, area, volume and capacity, and related compound units. Learners should be able to convert between units efficiently. Learners should be able to use rulers and protractors to measure the lengths of lines and the sizes of angles.

Calculators

If no reference is made in the specification to calculator use then learners are expected to be able to use both calculator and non-calculator methods. All content may be assessed on either the calculator or non-calculator papers.

Sketching and plotting curves

This specification makes a distinction between sketching and plotting curves.

- A **sketch** shows the most important features of a curve. It does not have to be to scale, though axes should be labelled and the graph should interact with the axes correctly. A sketch should fall within the correct quadrants and show the correct long-term behaviour. A sketch only needs to be labelled with x-intercepts, y-intercepts, turning points or other features when requested in the assessment. A sketch does not require graph or squared paper. The assessment for this specification will expect a sketch to be drawn freehand.
- A **plot** is drawn on squared or graph paper for a given range of values by calculating the coordinates of points on the curve and connecting them as appropriate. Where a table of values is given it will include sufficient points to determine the curve. Where such a table is not given, the number of points required is left to the discretion of the learner.

Statement References

Individual references for the statements of this specification are included in the column headed 'GCSE (9–1) Content Ref.'. Corresponding statements from the Department for Education (DfE) *Mathematics – GCSE subject content and assessment objectives* document are included in the column headed 'DfE Ref.'.

For further information on this specification including our accessibility principles, content weightings, command words, formulae guides and example questions, please download our [Exploring Our Question Papers](#) guide.

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|--------------------------------|--|---|--|------------|
| OCR 1 | Number Operations and Integers | | | | |
| 1.01 | Calculations with integers | | | | |
| 1.01a | Four rules | Use non-calculator methods to calculate the sum, difference, product and quotient of positive and negative whole numbers. | | | N2 |
| 1.02 | Whole number theory | | | | |
| 1.02a | Definitions and terms | Understand and use the terms odd, even, prime, factor (divisor), multiple, common factor (divisor), common multiple, square, cube, root. Understand and use place value. | | | N2, N4, N6 |
| 1.02b | Prime numbers | Identify prime numbers less than 20. Express a whole number as a product of its prime factors. e.g. $24 = 2 \times 2 \times 2 \times 3$ Understand that each number can be expressed as a product of prime factors in only one way. | Identify prime numbers. Use power notation in expressing a whole number as a product of its prime factors. e.g. $600 = 2^3 \times 3 \times 5^2$ | | N4, N6 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|--|---|--|--|----------|
| 1.02c | Highest Common Factor (HCF) and Lowest Common Multiple (LCM) | Find the HCF and LCM of two whole numbers by listing. | Find the HCF and LCM of two whole numbers from their prime factorisations. | | N4 |
| 1.03 | Combining arithmetic operations | | | | |
| 1.03a | Priority of operations | Know the conventional order for performing calculations involving brackets, four rules and powers, roots and reciprocals. | | | N3 |
| 1.04 | Inverse operations | | | | |
| 1.04a | Inverse operations | <p>Know that addition and subtraction, multiplication and division, and powers and roots, are inverse operations and use this to simplify and check calculations, for example, in reversing arithmetic in “I’m thinking of a number” or “missing digit” problems.</p> <p>e.g. $223 - 98 = 223 + 2 - 100 = 125$ $25 \times 12 = 50 \times 6 = 100 \times 3 = 300$</p> <p><i>[see also Calculation and estimation of powers and roots, 3.01b]</i></p> | | | N3, N6 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|-------------------------------------|---|---|--|-------------|
| OCR 2 | Fractions, Decimals and Percentages | | | | |
| 2.01 | Fractions | | | | |
| 2.01a | Equivalent fractions | Recognise and use equivalence between simple fractions and mixed numbers. e.g. $\frac{2}{6} = \frac{1}{3}$ $2\frac{1}{2} = \frac{5}{2}$ | | | N3 |
| 2.01b | Calculations with fractions | Add, subtract, multiply and divide simple fractions (proper and improper), including mixed numbers and negative fractions. e.g. $1\frac{1}{2} + \frac{3}{4}$ $\frac{5}{6} \times \frac{3}{10}$ $-3 \times \frac{4}{5}$ | Carry out more complex calculations, including the use of improper fractions. e.g. $\frac{2}{5} + \frac{5}{6}$ $\frac{2}{3} + \frac{1}{2} \times \frac{3}{5}$ | [see also <i>Algebraic fractions, 6.01g</i>] | N2, N8 |
| 2.01c | Fractions of a quantity | Calculate a fraction of a quantity. e.g. $\frac{2}{5}$ of £3.50 Express one quantity as a fraction of another. <i>[see also Ratios and fractions, 5.01c]</i> | Calculate with fractions greater than 1. | | N12, R3, R6 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|--|--|--|--|----------|
| 2.02 | Decimal fractions | | | | |
| 2.02a | Decimals and fractions | Express a simple fraction as a terminating decimal or vice versa, without a calculator. e.g. $0.4 = \frac{2}{5}$ Understand and use place value in decimals. | Use division to convert a simple fraction to a decimal. e.g. $\frac{1}{6} = 0.16666\dots$ | Convert a recurring decimal to an exact fraction or vice versa. e.g. $0.\dot{4}1 = \frac{41}{99}$ | N10, N2 |
| 2.02b | Addition, subtraction and multiplication of decimals | Add, subtract and multiply decimals including negative decimals, without a calculator. | | | N2 |
| 2.02c | Division of decimals | Divide a decimal by a whole number, including negative decimals, without a calculator. e.g. $0.24 \div 6$ | Without a calculator, divide a decimal by a decimal. e.g. $0.3 \div 0.6$ | | N2 |
| 2.03 | Percentages | | | | |
| 2.03a | Percentage conversions | Convert between fractions, decimals and percentages. e.g. $\frac{1}{4} = 0.25 = 25\%$ $1\frac{1}{2} = 150\%$ | | | R9 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|---|--|---|--|------------|
| 2.03b | Percentage calculations | Understand percentage is ‘number of parts per hundred’. Calculate a percentage of a quantity, and express one quantity as a percentage of another, with or without a calculator. | | | R9, N12 |
| 2.03c | Percentage change | Increase or decrease a quantity by a simple percentage, including simple decimal or fractional multipliers. Apply this to simple original value problems and simple interest. e.g. Add 10% to £2.50 by either finding 10% and adding, or by multiplying by 1.1 or $\frac{110}{100}$ Calculate original price of an item costing £10 after a 50% discount. | Express percentage change as a decimal or fractional multiplier. Apply this to percentage change problems (including original value problems). <i>[see also Growth and decay, 5.03a]</i> | | R9, N12 |
| 2.04 | Ordering fractions, decimals and percentages | | | | |
| 2.04a | Ordinality | Order integers, fractions, decimals and percentages. e.g. $\frac{4}{5}$, $\frac{3}{4}$, 0.72, -0.9 | | | N1, N2, R9 |
| 2.04b | Symbols | Use $<$, $>$, \leq , \geq , $=$, \neq | | | N1 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|--|---|---|---|-----------|
| OCR 3 | Indices and Surds | | | | |
| 3.01 | Powers and roots | | | | |
| 3.01a | Index notation | Use positive integer indices to write, for example, $2 \times 2 \times 2 \times 2 = 2^4$ | Use negative integer indices to represent reciprocals. | Use fractional indices to represent roots and combinations of powers and roots. | N6, N7 |
| 3.01b | Calculation and estimation of powers and roots | Calculate positive integer powers and exact roots. e.g. $2^4 = 16$ $\sqrt{9} = 3$ $\sqrt[3]{8} = 2$ Recognise simple powers of 2, 3, 4 and 5. e.g. $27 = 3^3$ <i>[see also Inverse operations, 1.04a]</i> | Calculate with integer powers. e.g. $2^{-3} = \frac{1}{8}$ Calculate with roots. | Calculate fractional powers. e.g. $16^{-\frac{3}{4}} = \frac{1}{(\sqrt[4]{16})^3} = \frac{1}{8}$ Estimate powers and roots. e.g. $\sqrt{51}$ to the nearest whole number | N6, N7 |
| 3.01c | Laws of indices | <i>[see also Simplifying products and quotients, 6.01c]</i> | Know and apply: $a^m \times a^n = a^{m+n}$ $a^m \div a^n = a^{m-n}$ $(a^m)^n = a^{mn}$ <i>[see also Calculations with numbers in standard form, 3.02b, Simplifying products and quotients, 6.01c]</i> | | N7, A4 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|--|--|--|--|-----------|
| 3.02 | Standard form | | | | |
| 3.02a | Standard form | Interpret and order numbers expressed in standard form. Convert numbers to and from standard form. e.g. $1320 = 1.32 \times 10^3$, $0.00943 = 9.43 \times 10^{-3}$ | | | N9 |
| 3.02b | Calculations with numbers in standard form | Use a calculator to perform calculations with numbers in standard form. | Add, subtract, multiply and divide numbers in standard form, without a calculator. <i>[see also Laws of indices, 3.01c]</i> | | N9 |
| 3.03 | Exact calculations | | | | |
| 3.03a | Exact calculations | Use fractions in exact calculations without a calculator. | Use multiples of π in exact calculations without a calculator. | Use surds in exact calculations without a calculator. | N2, N8 |
| 3.03b | Manipulating surds | | | Simplify expressions with surds, including rationalising denominators. e.g. $\sqrt{12} = 2\sqrt{3}$ $\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$ $\frac{1}{\sqrt{3}+1} = \frac{\sqrt{3}-1}{2}$ | N8 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|------------------------------|---|--|--|----------|
| OCR 4 | Approximation and Estimation | | | | |
| 4.01 | Approximation and estimation | | | | |
| 4.01a | Rounding | Round numbers to the nearest whole number, ten, hundred, etc. or to a given number of significant figures (sf) or decimal places (dp). | Round answers to an appropriate level of accuracy. | | N15 |
| 4.01b | Estimation | Estimate or check, without a calculator, the result of a calculation by using suitable approximations. e.g. Estimate, to one significant figure, the cost of 2.8 kg of potatoes at 68p per kg. | Estimate or check, without a calculator, the result of more complex calculations including roots. Use the symbol \approx appropriately. e.g. $\sqrt{\frac{2.9}{0.051 \times 0.62}} \approx 10$ | | N14 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|---------------------------------------|--|--|---|-------------|
| 4.01c | Upper and lower bounds | | <p>Use inequality notation to write down an error interval for a number or measurement rounded or truncated to a given degree of accuracy.</p> <p>e.g. If $x = 2.1$ rounded to 1 dp, then $2.05 \leq x < 2.15$.</p> <p>If $x = 2.1$ truncated to 1 dp, then $2.1 \leq x < 2.2$.</p> <p>Apply and interpret limits of accuracy.</p> | <p>Calculate the upper and lower bounds of a calculation using numbers rounded to a known degree of accuracy.</p> <p>e.g. Calculate the area of a rectangle with length and width given to 2 sf.</p> <p>Understand the difference between bounds of discrete and continuous quantities.</p> <p>e.g. If you have 200 cars to the nearest hundred then the number of cars n satisfies:</p> $150 \leq n < 250 \text{ and}$ $150 \leq n \leq 249.$ | N15, N16 |
| OCR 5 | Ratio, Proportion and Rates Of Change | | | | |
| 5.01 | Calculations with ratio | | | | |
| 5.01a | Equivalent ratios | <p>Find the ratio of quantities in the form $a : b$ and simplify.</p> <p>Find the ratio of quantities in the form $1 : n$.</p> <p>e.g. $50 \text{ cm} : 1.5 \text{ m} = 50 : 150 = 1 : 3$</p> | | | R4, R5 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|-------------------------------------|--|---|--|-----------------|
| 5.01b | Division in a given ratio | <p>Split a quantity into two parts given the ratio of the parts. e.g. £2.50 in the ratio 2 : 3</p> <p>Express the division of a quantity into two parts as a ratio.</p> <p>Calculate one quantity from another, given the ratio of the two quantities.</p> | Split a quantity into three or more parts given the ratio of the parts. | | R5, R6 |
| 5.01c | Ratios and fractions | <p>Interpret a ratio of two parts as a fraction of a whole. e.g. £9 split in the ratio 2 : 1 gives parts $\frac{2}{3} \times £9$ and $\frac{1}{3} \times £9$.</p> <p><i>[see also Fractions of a quantity, 2.01c]</i></p> | | | N11, R5, R6, R8 |
| 5.01d | Solve ratio and proportion problems | <p>Solve simple ratio and proportion problems. e.g. Adapt a recipe for 6 for 4 people.</p> <p>Understand the relationship between ratio and linear functions.</p> | | | R5, R8 |

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| 5.02 | Direct and inverse proportion | | | | |
| 5.02a | Direct proportion | <p>Solve simple problems involving quantities in direct proportion including algebraic proportions.</p> <p>e.g. Using equality of ratios, if $y \propto x$, then $\frac{y_1}{y_2} = \frac{x_1}{x_2}$ or</p> $\frac{y_1}{x_1} = \frac{y_2}{x_2}.$ <p>Currency conversion problems.</p> <p><i>[see also Similar shapes, 9.04c]</i></p> | <p>Solve more formal problems involving quantities in direct proportion (i.e. where $y \propto x$).</p> <p>Recognise that if $y = kx$, where k is a constant, then y is proportional to x.</p> | <p>Formulate equations and solve problems involving a quantity in direct proportion to a power or root of another quantity.</p> | R7, R10, R13 |
| 5.02b | Inverse proportion | <p>Solve simple word problems involving quantities in inverse proportion or simple algebraic proportions.</p> <p>e.g. speed–time contexts (if speed is doubled, time is halved).</p> | <p>Solve more formal problems involving quantities in inverse proportion (i.e. where $y \propto \frac{1}{x}$).</p> <p>Recognise that if $y = \frac{k}{x}$, where k is a constant, then y is inversely proportional to x.</p> | <p>Formulate equations and solve problems involving a quantity in inverse proportion to a power or root of another quantity.</p> | R10, R13 |

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| 5.03 | Discrete growth and decay | | | | |
| 5.03a | Growth and decay | Calculate simple interest including in financial contexts. | Solve problems step-by-step involving multipliers over a given interval, for example, compound interest, depreciation, etc. e.g. A car worth £15 000 new depreciating by 30%, 20% and 15% respectively in three years. <i>[see also Percentage change, 2.03c]</i> | Express exponential growth or decay as a formula. e.g. Amount £A subject to compound interest of 10% p.a. on £100 as $A = 100 \times 1.1^n$. Solve and interpret answers in growth and decay problems. <i>[see also Exponential functions, 7.01d, Formulate algebraic expressions, 6.02a]</i> | R9, R16 |
| OCR 6 | Algebra | | | | |
| 6.01 | Algebraic expressions | | | | |
| 6.01a | Algebraic terminology and proofs | Understand and use the concepts and vocabulary of expressions, equations, formulae, inequalities, terms and factors. | Recognise the difference between an equation and an identity, and show algebraic expressions are equivalent. e.g. show that $(x + 1)^2 + 2 = x^2 + 2x + 3$ Use algebra to construct arguments. | Use algebra to construct proofs and arguments. e.g. prove that the sum of three consecutive integers is a multiple of 3. | A3, A6 |
| 6.01b | Collecting like terms in sums and differences of terms | Simplify algebraic expressions by collecting like terms. e.g. $2a + 3a = 5a$ | | | A1, A3, A4 |

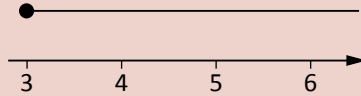
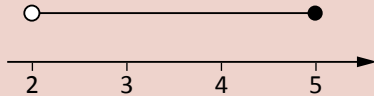
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| 6.01c | Simplifying products and quotients | Simplify algebraic products and quotients. e.g. $a \times a \times a = a^3$ $2a \times 3b = 6ab$ $a^2 \times a^3 = a^5$ $3a^3 \div a = 3a^2$ <i>[see also Laws of indices, 3.01c]</i> | | Simplify algebraic products and quotients using the laws of indices. e.g. $a^{\frac{1}{2}} \times 2a^{-3} = 2a^{-\frac{5}{2}}$ $2a^2b^3 \div 4a^{-3}b = \frac{1}{2}a^5b^2$ | N3, A1, A4 |
| 6.01d | Multiplying out brackets | Simplify algebraic expressions by multiplying a single term over a bracket. e.g. $2(a + 3b) = 2a + 6b$ $2(a + 3b) + 3(a - 2b) = 5a$ | Expand products of two binomials. e.g. $(x - 1)(x - 2) = x^2 - 3x + 2$ $(a + 2b)(a - b) = a^2 + ab - 2b^2$ | Expand products of more than two binomials. e.g. $(x + 1)(x - 1)(2x + 1)$ $= 2x^3 + x^2 - 2x - 1$ | A1, A3, A4 |
| 6.01e | Factorising | Take out common factors. e.g. $3a - 9b = 3(a - 3b)$ $2x + 3x^2 = x(2 + 3x)$ | Factorise quadratic expressions of the form $x^2 + bx + c$. e.g. $x^2 - x - 6 = (x - 3)(x + 2)$ $x^2 - 16 = (x - 4)(x + 4)$ $x^2 - 3 = (x - \sqrt{3})(x + \sqrt{3})$ | Factorise quadratic expressions of the form $ax^2 + bx + c$ (where $a \neq 0$ or 1) e.g. $2x^2 + 3x - 2 = (2x - 1)(x + 2)$ | A1, A3, A4 |
| 6.01f | Completing the square | | | Complete the square on a quadratic expression. e.g. $x^2 + 4x - 6 = (x + 2)^2 - 10$ $2x^2 + 5x + 1 = 2\left(x + \frac{5}{4}\right)^2 - \frac{17}{8}$ | A11, A18 |

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| 6.01g | Algebraic fractions | | | Simplify and manipulate algebraic fractions. e.g. Write $\frac{1}{n-1} + \frac{n}{n+1}$ as a single fraction. Simplify $\frac{n^2 + 2n}{n^2 + n - 2}$. | A1, A4 |
| 6.02 | Algebraic formulae | | | | |
| 6.02a | Formulate algebraic expressions | | Formulate simple formulae and expressions from real-world contexts. e.g. Cost of car hire at £50 per day plus 10p per mile. The perimeter of a rectangle when the length is 2 cm more than the width. | [see, for example, <i>Direct proportion, 5.02a, Inverse proportion, 5.02b, Growth and decay, 5.03a</i>] | A3, A5, A21, R10 |
| 6.02b | Substitute numerical values into formulae and expressions | Substitute positive numbers into simple expressions and formulae to find the value of the subject. e.g. Given that $v = u + at$, find v when $t = 1$, $a = 2$ and $u = 7$. | Substitute positive or negative numbers into more complex formulae, including powers, roots and algebraic fractions. e.g. $v = \sqrt{u^2 + 2as}$ with $u = 2.1$, $s = 0.18$, $a = -9.8$. | | A2, A5 |

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| 6.02c | Change the subject of a formula | Rearrange formulae to change the subject, where the subject appears once only. e.g. Make d the subject of the formula $c = \pi d$. Make x the subject of the formula $y = 3x - 2$. | Rearrange formulae to change the subject, including cases where the subject appears twice, or where a power or reciprocal of the subject appears. e.g. Make t the subject of the formulae (i) $s = \frac{1}{2}at^2$ (ii) $v = \frac{x}{t}$ (iii) $2ty = t + 1$ | <i>[Examples may include manipulation of algebraic fractions, 6.01g]</i> | A4, A5 |
| 6.02d | Recall and use standard formulae | Recall and use: Circumference of a circle $2\pi r = \pi d$ Area of a circle πr^2 | Recall and use: Pythagoras' theorem $a^2 + b^2 = c^2$ Trigonometry formulae $\sin \theta = \frac{o}{h}$, $\cos \theta = \frac{a}{h}$, $\tan \theta = \frac{o}{a}$ | Recall and use: The quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$ Area of a triangle $\frac{1}{2}ab \sin C$ | A2, A3, A5 |

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| 6.02e | Use kinematics formulae | Use: $v = u + at$ $s = ut + \frac{1}{2}at^2$ $v^2 = u^2 + 2as$ where a is constant acceleration, u is initial velocity, v is final velocity, s is displacement from position when $t = 0$ and t is time taken. | | | A2, A3, A5 |
| 6.03 | Algebraic equations | | | | |
| 6.03a | Linear equations in one unknown | Solve linear equations in one unknown algebraically. e.g. Solve $3x - 1 = 5$ | Set up and solve linear equations in mathematical and non-mathematical contexts, including those with the unknown on both sides of the equation. e.g. Solve $5(x - 1) = 4 - x$ Interpret solutions in context. | <i>[Examples may include manipulation of algebraic fractions, 6.01g]</i> | A3, A17, A21 |
| 6.03b | Quadratic equations | | Solve quadratic equations with coefficient of x^2 equal to 1 by factorising. e.g. Solve $x^2 - 5x + 6 = 0$. Find x for an x cm by $(x + 3)$ cm rectangle of area 40cm^2 . | Know the quadratic formula. Rearrange and solve quadratic equations by factorising, completing the square or using the quadratic formula. e.g. $2x^2 = 3x + 5$ $\frac{2}{x} - \frac{2}{x+1} = 1$ | A18 |

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| 6.03c | Simultaneous equations | | Set up and solve two linear simultaneous equations in two variables algebraically. e.g. Solve simultaneously $2x + 3y = 18$ and $y = 3x - 5$ | Set up and solve two simultaneous equations in two variables algebraically (including where one is a quadratic or that result in a quadratic). e.g. Solve simultaneously $x^2 + y^2 = 50$ and $2y = x + 5$ | A19, A21 |
| 6.03d | Approximate solutions using a graph | Use a graph to find the approximate solution of a linear equation. | Use graphs to find approximate roots of quadratic equations and the approximate solution of two linear simultaneous equations. | Know that the coordinates of the points of intersection of a curve and a straight line are the solutions to the simultaneous equations for the line and curve. | A11, A17, A18, A19 |
| 6.03e | Approximate solutions by iteration | | | Find approximate solutions to equations using systematic sign-change methods (for example, decimal search or interval bisection) when there is no simple analytical method of solving them. Specific methods will not be requested in the assessment. | A20, R16 |

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| 6.04 | Algebraic inequalities | | | | |
| 6.04a | Inequalities in one variable | Understand and use the symbols $<$, \leq , $>$ and \geq | <p>Solve linear inequalities in one variable, expressing solutions on a number line using the conventional notation.</p> <p>e.g. $2x + 1 \geq 7$</p>  <p>$1 < 3x - 5 \leq 10$</p>  | <p>Solve quadratic inequalities in one variable.</p> <p>e.g. $x^2 - 2x < 3$</p> <p>Express solutions in set notation.</p> <p>e.g. $\{x : x \geq 3\}$</p> <p>$\{x : 2 < x \leq 5\}$</p> <p><i>[see also Polynomial and reciprocal functions, 7.01c]</i></p> | N1, A3, A22 |
| 6.04b | Inequalities in two variables | | | <p>Solve (several) linear inequalities in two variables, representing the solution set on a graph.</p> <p><i>[see also Straight line graphs, 7.02a]</i></p> | A22 |

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| 6.05 | Language of functions | | | | |
| 6.05a | Functions | <p>Interpret, where appropriate, simple expressions as functions with inputs and outputs.</p> <p>e.g. $y = 2x + 3$ as</p> $x \rightarrow \boxed{\times 2} \rightarrow \boxed{+3} \rightarrow y$ | | <p>Interpret the reverse process as the ‘inverse function’.</p> <p>Interpret the succession of two functions as a ‘composite function’.</p> <p>[Knowledge of function notation will not be required]</p> <p><i>[see also Translations and reflections, 7.03a]</i></p> | A7 |
| 6.06 | Sequences | | | | |
| 6.06a | Generate terms of a sequence | <p>Generate a sequence by spotting a pattern or using a term-to-term rule given algebraically or in words.</p> <p>e.g. Continue the sequences</p> <p>1, 4, 7, 10, ...</p> <p>1, 4, 9, 16, ...</p> <p>Find a position-to-term rule for simple arithmetic sequences, algebraically or in words.</p> <p>e.g. 2, 4, 6, ... $2n$</p> <p>3, 4, 5, ... $n + 2$</p> | <p>Generate a sequence from a formula for the nth term.</p> <p>e.g. nth term = $n^2 + 2n$ gives 3, 8, 15, ...</p> <p>Find a formula for the nth term of an arithmetic sequence.</p> <p>e.g. 40, 37, 34, 31, ... $43 - 3n$</p> | <p>Use subscript notation for position-to-term and term-to-term rules.</p> <p>e.g. $x_n = n + 2$</p> $x_{n+1} = 2x_n - 3$ <p>Find a formula for the nth term of a quadratic sequence.</p> <p>e.g. 0, 3, 10, 21, ...</p> $u_n = 2n^2 - 3n + 1$ | A23, A25 |

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| 6.06b | Special sequences | Recognise sequences of triangular, square and cube numbers, and simple arithmetic progressions. | Recognise Fibonacci and quadratic sequences, and simple geometric progressions (r^n where n is an integer and r is a rational number > 0). | Generate and find n th terms of other sequences. e.g. $1, \sqrt{2}, 2, 2\sqrt{2}, \dots$ $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \dots$ | A24 |
| OCR 7 | Graphs of Equations and Functions | | | | |
| 7.01 | Graphs of equations and functions | | | | |
| 7.01a | x- and y-coordinates | Work with x- and y-coordinates in all four quadrants. | | | A8 |
| 7.01b | Graphs of equations and functions | Use a table of values to plot graphs of linear and quadratic functions. e.g. $y = 2x + 3$ $y = 2x^2 + 1$ | Use a table of values to plot other polynomial graphs and reciprocals. e.g. $y = x^3 - 2x$ $y = x + \frac{1}{x}$ $2x + 3y = 6$ | Use a table of values to plot exponential graphs. e.g. $y = 3 \times 1.1^x$ | A9, A14 |
| 7.01c | Polynomial and reciprocal functions | Recognise and sketch the graphs of simple linear and quadratic functions. e.g. $y = 2$ $x = 1$ $y = 2x$ $y = x^2$ | Recognise and sketch graphs of: $y = x^3, y = \frac{1}{x}$. Identify intercepts and, using symmetry, the turning point of graphs of quadratic functions. Find the roots of a quadratic equation algebraically. | Sketch graphs of quadratic functions, identifying the turning point by completing the square. | A11, A12 |
| 7.01d | Exponential functions | | | Recognise and sketch graphs of exponential functions in the form $y = k^x$ for positive k . | A12 |

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| 7.01e | Trigonometric functions | | | Recognise and sketch the graphs of $y = \sin x$, $y = \cos x$ and $y = \tan x$. | A12 |
| 7.01f | Equations of circles | | | Recognise and use the equation of a circle with centre at the origin. | A16 |
| 7.02 | Straight line graphs | | | | |
| 7.02a | Straight line graphs | Find and interpret the gradient and intercept of straight lines, graphically and using $y = mx + c$. | Use the form $y = mx + c$ to find and sketch equations of straight lines. Find the equation of a line through two given points, or through one point with a given gradient. | Identify the solution sets of linear inequalities in two variables, using the convention of dashed and solid lines. | A9, A10, A22 |
| 7.02b | Parallel and perpendicular lines | | Identify and find equations of parallel lines. | Identify and find equations of perpendicular lines. Calculate the equation of a tangent to a circle at a given point. <i>[see also Equations of circles, 7.01f]</i> | A9, A16 |

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| 7.03 | Transformations of curves and their equations | | | | |
| 7.03a | Translations and reflections | | | Identify and sketch translations and reflections of a given graph (or the graph of a given equation). [Knowledge of function notation will not be required] <i>[see also Functions, 6.05a]</i> e.g. Sketch the graph of $y = \sin x + 2$ $y = (x + 2)^2 - 1$ $y = -x^2$ | A13 |
| 7.04 | Interpreting graphs | | | | |
| 7.04a | Graphs of real-world contexts | Construct and interpret graphs in real-world contexts. e.g. distance-time money conversion temperature conversion <i>[see also Direct proportion, 5.02a, Inverse proportion, 5.02b]</i> | Recognise and interpret graphs that illustrate direct and inverse proportion. | | A14, R10, R14 |

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| 7.04b | Gradients | Understand the relationship between gradient and ratio. | Interpret straight line gradients as rates of change. e.g. Gradient of a distance-time graph as a velocity. | Calculate or estimate gradients of graphs, and interpret in contexts such as distance-time graphs, velocity-time graphs and financial graphs. Apply the concepts of average and instantaneous rate of change (gradients of chords or tangents) in numerical, algebraic and graphical contexts. | A14, A15, R8, R14, R15 |
| 7.04c | Areas | | | Calculate or estimate areas under graphs, and interpret in contexts such as distance-time graphs, velocity-time graphs and financial graphs. | A15 |
| OCR 8 | Basic Geometry | | | | |
| 8.01 | Conventions, notation and terms Learners will be expected to be familiar with the following geometrical skills, conventions, notation and terms, which will be assessed in questions at both tiers. | | | | |
| 8.01a | 2D and 3D shapes | Use the terms points, lines, line segments, vertices, edges, planes, parallel lines, perpendicular lines. | | | G1 |
| 8.01b | Angles | Know the terms acute, obtuse, right and reflex angles. Use the standard conventions for labelling and referring to the sides and angles of triangles. e.g. AB, $\angle ABC$, angle ABC, a is the side opposite angle A | | | G1 |

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| 8.01c | Polygons | Know the terms: <ul style="list-style-type: none"> regular polygon scalene, isosceles and equilateral triangle quadrilateral, square, rectangle, kite, rhombus, parallelogram, trapezium pentagon, hexagon, octagon. | | | G1 |
| 8.01d | Polyhedra and other solids | Recognise the terms face, surface, edge, and vertex, cube, cuboid, prism, cylinder, pyramid, cone and sphere. | | | G12 |
| 8.01e | Diagrams | Draw diagrams from written descriptions as required by questions. | | | G1 |
| 8.01f | Geometrical instruments | Use a ruler to construct and measure straight lines. Use a protractor to construct and measure angles. Use compasses to construct circles. | | | G2, G15 |
| 8.01g | x - and y -coordinates | Use x - and y -coordinates in plane geometry problems, including transformations of simple shapes. | | | G7, G11 |
| 8.02 | Ruler and compass constructions | | | | |
| 8.02a | Perpendicular bisector | | Construct the perpendicular bisector and midpoint of a line segment. | | G2 |
| 8.02b | Angle bisector | | Construct the bisector of an angle formed from two lines. | | G2 |

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| 8.02c | Perpendicular from a point to a line | | <p>Construct the perpendicular from a point to a line.</p> <p>Construct the perpendicular to a line at a point.</p> <p>Know that the perpendicular distance from a point to a line is the shortest distance to the line.</p> | | G2 |
| 8.02d | Loci | | <p>Apply ruler and compass constructions to construct figures and identify the loci of points, to include real-world problems.</p> <p>Understand the term ‘equidistant’.</p> | | G2 |
| 8.03 | Angles | | | | |
| 8.03a | Angles at a point | Know and use the sum of the angles at a point is 360° . | <p>Apply these angle facts to find angles in rectilinear figures, and to justify results in simple proofs.</p> <p>e.g. The sum of the interior angles of a triangle is 180°.</p> | Apply these angle properties in more formal proofs of geometrical results. | G3, G6 |
| 8.03b | Angles on a line | Know that the sum of the angles at a point on a line is 180° . | | | G3, G6 |
| 8.03c | Angles between intersecting and parallel lines | Know and use: vertically opposite angles are equal alternate angles on parallel lines are equal corresponding angles on parallel lines are equal. | | | G3, G6 |

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| 8.03d | Angles in polygons | <p>Derive and use the sum of the interior angles of a triangle is 180°.</p> <p>Derive and use the sum of the exterior angles of a polygon is 360°.</p> <p>Find the sum of the interior angles of a polygon.</p> <p>Find the interior angle of a regular polygon.</p> | <p>Apply these angle facts to find angles in rectilinear figures, and to justify results in simple proofs.</p> <p>e.g. The sum of the interior angles of a triangle is 180°.</p> | Apply these angle properties in more formal proofs of geometrical results. | G3, G6 |
| 8.04 | Properties of polygons | | | | |
| 8.04a | Properties of a triangle | <p>Know the basic properties of isosceles, equilateral and right-angled triangles.</p> <p>Give geometrical reasons to justify these properties.</p> | Use these facts to find lengths and angles in rectilinear figures and in simple proofs. | Use these facts in more formal proofs of geometrical results, for example circle theorems. | G4, G6 |
| 8.04b | Properties of quadrilaterals | <p>Know the basic properties of the square, rectangle, parallelogram, trapezium, kite and rhombus.</p> <p>Give geometrical reasons to justify these properties.</p> | Use these facts to find lengths and angles in rectilinear figures and in simple proofs. | Use these facts in more formal proofs of geometrical results, for example circle theorems. | G4, G6 |
| 8.04c | Symmetry | Identify reflection and rotation symmetries of triangles, quadrilaterals and other polygons. | | | G1, G4 |

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| 8.05 | Circles | | | | |
| 8.05a | Circle nomenclature | Understand and use the terms centre, radius, chord, diameter and circumference. | Understand and use the terms tangent, arc, sector and segment. | | G9 |
| 8.05b | Angles subtended at centre and circumference | | | Apply and prove: the angle subtended by an arc at the centre is twice the angle at the circumference. | G10 |
| 8.05c | Angle in a semicircle | | | Apply and prove: the angle on the circumference subtended by a diameter is a right angle. | G10 |
| 8.05d | Angles in the same segment | | | Apply and prove: two angles in the same segment are equal. | G10 |
| 8.05e | Angle between radius and chord | | | Apply and prove: a radius or diameter bisects a chord if and only if it is perpendicular to the chord. | G10 |
| 8.05f | Angle between radius and tangent | | | Apply and prove: for a point P on the circumference, the radius or diameter through P is perpendicular to the tangent at P. | G10 |

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| 8.05g | The alternate segment theorem | | | Apply and prove: for a point P on the circumference, the angle between the tangent and a chord through P equals the angle subtended by the chord in the opposite segment. | G10 |
| 8.05h | Cyclic quadrilaterals | | | Apply and prove: the opposite angles of a cyclic quadrilateral are supplementary. | G10 |
| 8.06 | Three-dimensional shapes | | | | |
| 8.06a | 3-dimensional solids | Recognise and know the properties of the cube, cuboid, prism, cylinder, pyramid, cone and sphere. | | | G12 |
| 8.06b | Plans and elevations | Interpret plans and elevations of simple 3D solids. | Construct plans and elevations of simple 3D solids, and representations (e.g. using isometric paper) of solids from plans and elevations. | | G1, G13 |
| OCR 9 | Congruence and Similarity | | | | |
| 9.01 | Plane isometric transformations | | | | |
| 9.01a | Reflection | Reflect a simple shape in a given mirror line, and identify the mirror line from a shape and its image. | Identify a mirror line $x = a$, $y = b$ or $y = \pm x$ from a simple shape and its image under reflection. | | G7 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|---------------------------------|--|---|---|----------|
| 9.01b | Rotation | Rotate a simple shape clockwise or anti-clockwise through a multiple of 90° about a given centre of rotation. | Identify the centre, angle and sense of a rotation from a simple shape and its image under rotation. | | G7 |
| 9.01c | Translation | Use a column vector to describe a translation of a simple shape, and perform a specified translation. | | | G7, G24 |
| 9.01d | Combinations of transformations | | | Perform a sequence of isometric transformations (reflections, rotations or translations), on a simple shape. Describe the resulting transformation and the changes and invariance achieved. | G8 |
| 9.02 | Congruence | | | | |
| 9.02a | Congruent triangles | Identify congruent triangles. | Prove that two triangles are congruent using the cases: 3 sides (SSS) 2 angles, 1 side (ASA) 2 sides, included angle (SAS) Right angle, hypotenuse, side (RHS). | | G5, G7 |
| 9.02b | Applying congruent triangles | | Apply congruent triangles in calculations and simple proofs. e.g. The base angles of an isosceles triangle are equal. | | G6, G19 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|-----------------------|--|---|---|-------------|
| 9.03 | Plane vector geometry | | | | |
| 9.03a | Vector arithmetic | | Understand addition, subtraction and scalar multiplication of vectors. | Use vectors in geometric arguments and proofs. | G25 |
| 9.03b | Column vectors | | Represent a 2-dimensional vector as a column vector, and draw column vectors on a square or coordinate grid. | | G25 |
| 9.04 | Similarity | | | | |
| 9.04a | Similar triangles | Identify similar triangles. | Prove that two triangles are similar. | | G6, G7 |
| 9.04b | Enlargement | Enlarge a simple shape from a given centre using a whole number scale factor, and identify the scale factor of an enlargement. | Identify the centre and scale factor (including fractional scale factors) of an enlargement of a simple shape, and perform such an enlargement on a simple shape. | Perform and recognise enlargements with negative scale factors. | R2, R12, G7 |
| 9.04c | Similar shapes | Compare lengths, areas and volumes using ratio notation and scale factors. | Apply similarity to calculate unknown lengths in similar figures. <i>[see also Direct proportion, 5.02a]</i> | Understand the relationship between lengths, areas and volumes of similar shapes. <i>[see also Direct proportion, 5.02a]</i> | R12, G19 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|---------------------------------|--|---|--|-------------------|
| OCR 10 | Mensuration | | | | |
| 10.01 | Units and measurement | | | | |
| 10.01a | Units of measurement | Use and convert standard units of measurement for length, area, volume/capacity, mass, time and money. | Use and convert standard units in algebraic contexts. | | N13, R1, G14 |
| 10.01b | Compound units | Use and convert simple compound units (e.g. for speed, rates of pay, unit pricing). Know and apply in simple cases: speed = distance ÷ time | Use and convert other compound units (e.g. density, pressure). Know and apply: density = mass ÷ volume Use and convert compound units in algebraic contexts. | | N13, R1, R11, G14 |
| 10.01c | Maps and scale drawings | Use the scale of a map, and work with bearings. Construct and interpret scale drawings. | | | R2, G15 |
| 10.02 | Perimeter calculations | | | | |
| 10.02a | Perimeter of rectilinear shapes | Calculate the perimeter of rectilinear shapes. | | | G17 |
| 10.02b | Circumference of a circle | Know and apply the formula circumference = $2\pi r = \pi d$ to calculate the circumference of a circle. | Calculate the arc length of a sector of a circle given its angle and radius. | | G17, G18 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|---|--|--|---|----------|
| 10.02c | Perimeter of composite shapes | Apply perimeter formulae in calculations involving the perimeter of composite 2D shapes. | | | G17, G18 |
| 10.03 | Area calculations | | | | |
| 10.03a | Area of a triangle | Know and apply the formula: $\text{area} = \frac{1}{2} \text{base} \times \text{height}$. | | Know and apply the formula: $\text{area} = \frac{1}{2} ab \sin C$. | G16, G23 |
| 10.03b | Area of a parallelogram | Know and apply the formula: $\text{area} = \text{base} \times \text{height}$. [Includes area of a rectangle] | | | G16 |
| 10.03c | Area of a trapezium | Calculate the area of a trapezium. | | | G16 |
| 10.03d | Area of a circle | Know and apply the formula $\text{area} = \pi r^2$ to calculate the area of a circle. | Calculate the area of a sector of a circle given its angle and radius. | | G17, G18 |
| 10.03e | Area of composite shapes | Apply area formulae in calculations involving the area of composite 2D shapes. | | | G17, G18 |
| 10.04 | Volume and surface area calculations | | | | |
| 10.04a | Polyhedra | Calculate the surface area and volume of cuboids and other right prisms (including cylinders). | | | G16 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|--|--|---|---|----------|
| 10.04b | Cones and spheres | | Calculate the surface area and volume of spheres, cones and simple composite solids (formulae will be given). | | N8, G17 |
| 10.04c | Pyramids | | Calculate the surface area and volume of a pyramid (the formula $\frac{1}{3}$ area of base \times height will be given). | | G17 |
| 10.05 | Triangle mensuration | | | | |
| 10.05a | Pythagoras' theorem | | Know, derive and apply Pythagoras' theorem $a^2 + b^2 = c^2$ to find lengths in right-angled triangles in 2D figures. | Apply Pythagoras' theorem in more complex figures, including 3D figures. | G6, G20 |
| 10.05b | Trigonometry in right-angled triangles | | Know and apply the trigonometric ratios, $\sin \theta$, $\cos \theta$ and $\tan \theta$ and apply them to find angles and lengths in right-angled triangles in 2D figures. <i>[see also Similar shapes, 9.04c]</i> | Apply the trigonometry of right-angled triangles in more complex figures, including 3D figures. | R12, G20 |
| 10.05c | Exact trigonometric ratios | | Know the exact values of $\sin \theta$ and $\cos \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° . Know the exact value of $\tan \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60° . | | R12, G21 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|--|--|--|--|----------|
| 10.05d | Sine rule | | | Know and apply the sine rule, $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$, to find lengths and angles. | G22 |
| 10.05e | Cosine rule | | | Know and apply the cosine rule, $a^2 = b^2 + c^2 - 2bc \cos A$, to find lengths and angles. | G22 |
| OCR 11 | Probability | | | | |
| 11.01 | Basic probability and experiments | | | | |
| 11.01a | The probability scale | Use the 0-1 probability scale as a measure of likelihood of random events, for example, 'impossible' with 0, 'evens' with 0.5, 'certain' with 1. | | | P3 |
| 11.01b | Relative frequency | Record, describe and analyse the relative frequency of outcomes of repeated experiments using tables and frequency trees. | | | P1 |
| 11.01c | Relative frequency and probability | Use relative frequency as an estimate of probability. | Understand that relative frequencies approach the theoretical probability as the number of trials increases. | | P3, P5 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|---|--|---|--|------------|
| 11.01d | Equally likely outcomes and probability | <p>Calculate probabilities, expressed as fractions or decimals, in simple experiments with equally likely outcomes, for example flipping coins, rolling dice, etc.</p> <p>Apply ideas of randomness and fairness in simple experiments.</p> <p>Calculate probabilities of simple combined events, for example rolling two dice and looking at the totals.</p> <p>Use probabilities to calculate the number of expected outcomes in repeated experiments.</p> | | | P2, P7 |
| 11.02 | Combined events and probability diagrams | | | | |
| 11.02a | Sample spaces | <p>Use tables and grids to list the outcomes of single events and simple combinations of events, and to calculate theoretical probabilities.</p> <p>e.g. Flipping two coins. Finding the number of orders in which the letters E, F and G can be written.</p> | <p>Use sample spaces for more complex combinations of events.</p> <p>e.g. Recording the outcomes for sum of two dice. Problems with two spinners.</p> | <p>Recognise when a sample space is the most appropriate form to use when solving a complex probability problem.</p> <p>Use the most appropriate diagrams to solve unstructured questions where the route to the solution is less obvious.</p> | N5, P6, P7 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|---------------------------------|--|--|---|-----------|
| 11.02b | Enumeration | Use systematic listing strategies. | | Use the product rule for counting numbers of outcomes of combined events. | N5 |
| 11.02c | Venn diagrams and sets | Use a two-circle Venn diagram to enumerate sets, and use this to calculate related probabilities. Use simple set notation to describe simple sets of numbers or objects. e.g. $A = \{\text{even numbers}\}$ $B = \{\text{mathematics learners}\}$ $C = \{\text{isosceles triangles}\}$ | Construct a Venn diagram to classify outcomes and calculate probabilities. Use set notation to describe a set of numbers or objects. e.g. $D = \{x : 1 < x < 3\}$ $E = \{x : x \text{ is a factor of } 280\}$ [Knowledge of intersection (\cap), union (\cup) and complement ($'$) notation will not be required.] | Construct tree diagrams, two-way tables or Venn diagrams to solve more complex probability problems (including conditional probabilities; structure for diagrams may not be given). [Knowledge of intersection (\cap), union (\cup) and complement ($'$) notation will not be required.] | P6, p9 |
| 11.02d | Tree diagrams | | Use tree diagrams to enumerate sets and to record the probabilities of successive events (tree frames may be given and in some cases will be partly completed). | | P6, P9 |
| 11.02e | The addition law of probability | Use the addition law for mutually exclusive events. Use $p(A) + p(\text{not } A) = 1$ | Derive or informally understand and apply the formula $p(A \text{ or } B) = p(A) + p(B) - p(A \text{ and } B).$ | | P4 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|---|--|---|--|----------|
| 11.02f | The multiplication law of probability and conditional probability | | Use tree diagrams and other representations to calculate the probability of independent and dependent combined events. | Understand the concept of conditional probability, and calculate it from first principles in known contexts. e.g. In a random cut of a pack of 52 cards, calculate the probability of drawing a diamond, given a red card is drawn. Derive or informally understand and apply the formula $p(A \text{ and } B) = p(A \text{ given } B)p(B)$. Know that events A and B are independent if and only if $p(A \text{ given } B) = p(A)$. | P8, P9 |
| OCR 12 | Statistics | | | | |
| 12.01 | Sampling | | | | |
| 12.01a | Populations and samples | | Define the population in a study, and understand the difference between population and sample. Infer properties of populations or distributions from a sample. Understand what is meant by simple random sampling, and bias in sampling. | | S1 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|------------------------------------|--|---|---|----------|
| 12.02 | Interpreting and representing data | | | | |
| 12.02a | Categorical and numerical data | Interpret and construct charts appropriate to the data type; including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data. Interpret multiple and composite bar charts. | Design tables to classify data. Interpret and construct line graphs for time series data, and identify trends (e.g. seasonal variations). | | S2 |
| 12.02b | Grouped data | | | Interpret and construct diagrams for grouped data as appropriate, i.e. cumulative frequency graphs and histograms (with either equal or unequal class intervals). | S3 S4 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|----------------------|---|--|---|-----------|
| 12.03 | Analysing data | | | | |
| 12.03a | Summary statistics | <p>Calculate the mean, mode, median and range for ungrouped data.</p> <p>Find the modal class, and calculate estimates of the range, mean and median for grouped data, and understand why they are estimates.</p> <p>Describe a population using statistics.</p> <p>Make simple comparisons.</p> <p>Compare data sets using 'like for like' summary values.</p> <p>Understand the advantages and disadvantages of summary values.</p> | | <p>Calculate estimates of mean, median, mode, range, quartiles and interquartile range from graphical representation of grouped data.</p> <p>Draw and interpret box plots. Use the median and interquartile range to compare distributions.</p> | S4, S5 |
| 12.03b | Misrepresenting data | Recognise graphical misrepresentation through incorrect scales, labels, etc. | | | S4 |

| GCSE (9–1) content Ref. | Subject content | Initial learning for this qualification will enable learners to... | Foundation tier learners should also be able to... | Higher tier learners should additionally be able to... | DfE Ref. |
|-------------------------|-----------------|---|--|--|----------|
| 12.03c | Bivariate data | Plot and interpret scatter diagrams for bivariate data. Recognise correlation. | Interpret correlation within the context of the variables, and appreciate the distinction between correlation and causation. Draw a line of best fit by eye, and use it to make predictions. Interpolate and extrapolate from data, and be aware of the limitations of these techniques. | | S6 |
| 12.03d | Outliers | Identify an outlier in simple cases. | Appreciate there may be errors in data from values (outliers) that do not 'fit'. Recognise outliers on a scatter graph. | | S4 |

2c. Prior knowledge, learning and progression

Learners in England who are beginning a GCSE (9–1) course are likely to have followed a Key Stage 3 programme of study, however there are no prior qualifications required in order for learners to enter for a GCSE (9–1) in Mathematics, nor is any prior knowledge or understanding required for entry onto this course.

GCSEs (9–1) are qualifications that enable learners to progress to further qualifications either Vocational or General.

There are a number of mathematics specifications available from OCR.

Find out more at www.ocr.org.uk.

3 Assessment of OCR GCSE (9–1) in Mathematics

3a. Forms of assessment

- The GCSE (9–1) in Mathematics is a linear qualification with 100% external assessment.
- This qualification consists of six examined components. Three are Foundation tier and three are Higher tier, all are externally assessed by OCR. Each carries an equal weighting of one third of the marks for that tier of the GCSE (9–1) qualification. Each examination has a duration of 1 hour and 30 minutes.
- Learners must take all three papers for the appropriate tier in the same series.
- Learners answer **all** questions on each paper.
- Learners are **not** permitted to use a calculator for Paper 2 on the Foundation tier or Paper 5 on the Higher tier.
- Learners are permitted to use a scientific or graphical calculator for Paper 1 and Paper 3 on the Foundation tier or Paper 4 and Paper 6 on the Higher tier. Calculators are subject to the rules in the document *Instructions for Conducting Examinations*, published annually by JCQ (www.jcq.org.uk).
- In each question paper, learners are expected to support their answers with appropriate working.
- Some questions will require an extended response to allow learners to demonstrate the ability to construct and develop a sustained line of mathematical reasoning.
- Learners should have the usual geometric instruments available. Tracing paper may also be used to aid with transformations and other mathematical functions.

3b. Total qualification time

Total qualification time (TQT) is the total amount of time, in hours, expected to be spent by a learner to achieve a qualification. It includes both guided learning hours and hours spent in preparation, study, and

assessment. The total qualification time for GCSE (9-1) in Mathematics is 140 hours. The total guided learning time is 120-140 hours.

3c. Qualification availability outside of England

This qualification is available in England. For Wales and Northern Ireland please check the Qualifications in Wales Portal (QIW) or the Northern Ireland Department of Education Performance Measures /

Northern Ireland Entitlement Framework Qualifications Accreditation Number (NIEFQAN) list to see current availability.

3d. Language

This qualification is available in English only. All assessment materials are available in English only and all candidate work must be in English.

3e. Assessment availability

There will be:

- one examination series available each year in May/June to all learners
- one examination series in November each year available **only** to learners who have reached at least the age of 16 on or before 31st August of that calendar year.

Learners must take all three papers for the appropriate tier in the same series.

This specification will be certificated from the June 2017 examination series onwards.

3f. Retaking the qualification

Learners can retake the qualification as many times as they wish. They retake all components of the qualification.

3g. Assessment objectives (AOs)

There are three Assessment objectives in the OCR GCSE (9–1) in Mathematics. These are detailed in the table below:

| | Assessment Objectives | Weighting | |
|------------|--|-----------|------------|
| | | Higher | Foundation |
| AO1 | <p>Use and apply standard techniques Learners should be able to:</p> <ul style="list-style-type: none"> accurately recall facts, terminology and definitions use and interpret notation correctly accurately carry out routine procedures or set tasks requiring multi-step solutions. | 40% | 50% |
| AO2 | <p>Reason, interpret and communicate mathematically Learners should be able to:</p> <ul style="list-style-type: none"> make deductions, inferences and draw conclusions from mathematical information construct chains of reasoning to achieve a given result interpret and communicate information accurately present arguments and proofs assess the validity of an argument and critically evaluate a given way of presenting information. <p>Where problems require learners to ‘use and apply standard techniques’ or to independently ‘solve problems’ a proportion of those marks should be attributed to the corresponding Assessment objective.</p> | 30% | 25% |
| AO3 | <p>Solve problems within mathematics and in other contexts Learners should be able to:</p> <ul style="list-style-type: none"> translate problems in mathematical or non-mathematical contexts into a process or a series of mathematical processes make and use connections between different parts of mathematics interpret results in the context of the given problem evaluate methods used and results obtained evaluate solutions to identify how they may have been affected by assumptions made. <p>Where problems require learners to ‘use and apply standard techniques’ or to ‘reason, interpret and communicate mathematically’ a proportion of those marks should be attributed to the corresponding Assessment objective.</p> | 30% | 25% |

Mark distribution of AO weightings in GCSE (9–1) Mathematics

The relationship between the Assessment objectives and the question papers at each tier in terms of **marks** are shown in the following tables.

| Component | AO1 | AO2 | AO3 | Total |
|-----------------------------------|-----|-----|-----|-------|
| Paper 1 (Foundation tier) J560/01 | 50 | 25 | 25 | 100 |
| Paper 2 (Foundation tier) J560/02 | 50 | 25 | 25 | 100 |
| Paper 3 (Foundation tier) J560/03 | 50 | 25 | 25 | 100 |
| | 150 | 75 | 75 | 300 |

| Component | AO1 | AO2 | AO3 | Total |
|-------------------------------|-----|-----|-----|-------|
| Paper 4 (Higher tier) J560/04 | 40 | 30 | 30 | 100 |
| Paper 5 (Higher tier) J560/05 | 40 | 30 | 30 | 100 |
| Paper 6 (Higher tier) J560/06 | 40 | 30 | 30 | 100 |
| | 120 | 90 | 90 | 300 |

3h. Tiers

This scheme of assessment consists of two tiers: Foundation tier and Higher tier. Foundation tier assesses grades 5 to 1 and Higher tier assesses grades 9 to 4. An allowed grade 3 may be awarded on the

Higher tier option for learners who are a small number of marks below the grade 3/4 boundary. Learners must be entered for either the Foundation tier or the Higher tier.

3i. Synoptic assessment

Synoptic assessment allows learners to demonstrate their understanding of the connections between different aspects of the subject. Making and understanding connections in this way is intrinsic to learning mathematics.

Synoptic assessment involves the explicit drawing together of knowledge, understanding and skills of different aspects of the GCSE (9–1) course. The emphasis of synoptic assessment is to encourage the understanding of mathematics as a discipline.

In the OCR GCSE (9–1) in Mathematics, topics are taught in progressively greater depth over the course. GCSE (9–1) outcomes may reflect or build upon subject content which is typically taught at Key Stage 3, revisiting earlier learning in a more challenging context.

The assessment for this specification will require learners to demonstrate their knowledge of the full content for their tier and to draw on the knowledge that they have gained from Key Stages 1, 2 and 3.

There is no expectation that teaching of such content should be repeated during the GCSE (9–1) course, but a solid foundation at Key Stage 3 is assumed. This foundation is exemplified by the first column of this specification.

Where a content statement in the first (or second) column is not developed in the second (or third) column, the expectation is that the content given for that strand will be developed further and connections with other parts of the specification explored even when not explicitly stated.

3j Calculating qualification results

A learner's overall qualification grade for GCSE (9–1) in Mathematics will be calculated by adding together their marks from the three components taken to give their total weighted mark.

This mark will then be compared to the qualification level grade boundaries for the entry option taken by the learner and for the relevant exam series to determine the learner's overall qualification grade.

4 Admin: what you need to know

The information in this section is designed to give an overview of the processes involved in administering this qualification so that you can speak to your exams officer. All of the following processes require you to submit something to OCR by a specific deadline.

More information about the processes and deadlines involved at each stage of the assessment cycle can be found in the Administration area of the OCR website. OCR's *Admin overview* is available on the OCR website at <http://www.ocr.org.uk/administration>

4a. Pre-assessment

Estimated entries

Estimated entries are your best projection of the number of learners who will be entered for a qualification in a particular series. Estimated entries

should be submitted to OCR by the specified deadline. They are free and do not commit your centre in any way.

Final entries

Final entries provide OCR with detailed data for each learner, showing each assessment to be taken. It is essential that you use the correct entry code, considering the relevant entry rules and ensuring that you choose the entry option for the assessment tier to be taken.

Final entries must be submitted to OCR by the published deadlines or late entry fees will apply.

All learners taking OCR GCSE (9–1) in Mathematics must be entered for one of the following entry options:

| Entry code | Title | Component code | Component title | Assessment type |
|------------|-------------------------------|----------------|---------------------------|---------------------|
| J560F | Mathematics (Foundation tier) | 01 | Paper 1 (Foundation tier) | External Assessment |
| | | 02 | Paper 2 (Foundation tier) | External Assessment |
| | | 03 | Paper 3 (Foundation tier) | External Assessment |
| J560H | Mathematics (Higher tier) | 04 | Paper 4 (Higher tier) | External Assessment |
| | | 05 | Paper 5 (Higher tier) | External Assessment |
| | | 06 | Paper 6 (Higher tier) | External Assessment |

Collecting evidence of student performance to ensure resilience in the qualifications system

Regulators have published guidance on collecting evidence of student performance as part of long-term contingency arrangements to improve the resilience of the qualifications system. You should review and consider this guidance when delivering this qualification to students at your centre.

For more detailed information on collecting evidence of student performance please visit our website at: <https://www.ocr.org.uk/administration/general-qualifications/assessment/>

4b. Accessibility and special consideration

Reasonable adjustments and access arrangements allow learners with special educational needs, disabilities or temporary injuries to access the assessment and show what they know and can do, without changing the demands of the assessment. Applications for these should be made before the examination series. Detailed information about eligibility for access arrangements can be found in the JCQ *Access Arrangements and Reasonable Adjustments*.

Special consideration is a post-assessment adjustment to marks or grades to reflect temporary injury, illness or other indisposition at the time the assessment was taken.

Detailed information about eligibility for special consideration can be found in the JCQ publication, *A guide to the special consideration process*.

4c. External assessment arrangements

Regulations governing examination arrangements are contained in the JCQ *Instructions for conducting examinations*.

Learners are permitted to use a scientific or graphical calculator for components 01, 03, 04 and 06. Calculators are subject to the rules in the document *Instructions for Conducting Examinations* published annually by JCQ (www.jcq.org.uk).

Head of Centre Annual Declaration

The Head of Centre is required to provide a declaration to the JCQ as part of the annual NCN update, conducted in the autumn term, to confirm that the centre is meeting all of the requirements detailed in the specification.

Any failure by a centre to provide the Head of Centre Annual Declaration will result in your centre status being suspended and could lead to the withdrawal of our approval for you to operate as a centre.

Private candidates

Private candidates may enter for OCR assessments.

A private candidate is someone who pursues a course of study independently but takes an examination or assessment at an approved examination centre. A private candidate may be a part-time student, someone taking a distance learning course, or someone being tutored privately. They must be based in the UK.

Private candidates need to contact OCR approved centres to establish whether they are prepared to host them as a private candidate. The centre may charge for this facility and OCR recommends that the arrangement is made early in the course.

Further guidance for private candidates may be found on the OCR website: ocr.org.uk/students/private-candidates

4d. Results and certificates

Grade Scale

GCSE (9–1) qualifications are graded on the scale: 9–1, where 9 is the highest. Learners who fail to reach the minimum standard of 1 will be Unclassified (U). Only

subjects in which grades 9 to 1 are attained will be recorded on certificates.

Results

Results are released to centres and learners for information and to allow any queries to be resolved before certificates are issued.

Centres will have access to the following results information for each learner:

- the grade for the qualification
- the raw mark for each component
- the total weighted mark for the qualification.

The following supporting information will be available:

- raw mark grade boundaries for each component
- weighted mark grade boundaries for each entry option.

Until certificates are issued, results are deemed to be provisional and may be subject to amendment. A learner's final results will be recorded on an OCR certificate.

The qualification title will be shown on the certificate as 'OCR Level 1/Level 2 GCSE (9–1) in Mathematics'.

4e. Post-results services

A number of post-results services are available:

- **Review of results** – If you are not happy with the outcome of a learner's results, centres may request a review of marking.

- **Missing and incomplete results** – This service should be used if an individual subject result for a learner is missing, or the learner has been omitted entirely from the results supplied.
- **Access to scripts** – Centres can request access to marked scripts.

4f. Malpractice

Any breach of the regulations for the conduct of examinations and coursework may constitute malpractice (which includes maladministration) and must be reported to OCR as soon as it is detected.

Detailed information on malpractice can be found in *Suspected Malpractice in Examinations and Assessments: Policies and Procedures* published by JCQ.

5 Appendices

5a. Grade descriptors

| | |
|---------|---|
| Grade 8 | <p>To achieve grade 8, candidates will be able to:</p> <ul style="list-style-type: none">• perform procedures accurately• interpret and communicate complex information accurately• make deductions and inferences and draw conclusions• construct substantial chains of reasoning, including convincing arguments and formal proofs• generate efficient strategies to solve complex mathematical and non-mathematical problems by translating them into a series of mathematical processes• make and use connections, which may not be immediately obvious, between different parts of mathematics• interpret results in the context of the given problem• critically evaluate methods, arguments, results and the assumptions made |
| Grade 5 | <p>To achieve grade 5, candidates will be able to:</p> <ul style="list-style-type: none">• perform routine single- and multi-step procedures effectively by recalling, applying and interpreting notation, terminology, facts, definitions and formulae• interpret and communicate information effectively• make deductions, inferences and draw conclusions• construct chains of reasoning, including arguments• generate strategies to solve mathematical and non-mathematical problems by translating them into mathematical processes, realising connections between different parts of mathematics• interpret results in the context of the given problem• evaluate methods and results |
| Grade 2 | <p>To achieve grade 2, candidates will be able to:</p> <ul style="list-style-type: none">• recall and use notation, terminology, facts and definitions; perform routine procedures, including some multi-step procedures• interpret and communicate basic information; make deductions and use reasoning to obtain results• solve problems by translating simple mathematical and non-mathematical problems into mathematical processes• provide basic evaluation of methods or results• interpret results in the context of the given problem |

5b. Overlap with other qualifications

There is a small degree of overlap between the content of this specification and those for GCSE Statistics and Free Standing Mathematics Qualifications.

5c. Avoidance of bias

The GCSE (9–1) qualification and subject criteria have been reviewed in order to identify any feature which could disadvantage learners who share a protected

characteristic as defined by the Equality Act 2010. All reasonable steps have been taken to minimise any such disadvantage.

Summary of Updates

| Date | Version | Section | Title of section | Change |
|---------------|---------|---------------------------|---|--|
| April 2018 | 1.1 | 4d | Results and certificates | Amend to certification titling |
| January 2020 | 1.2 | 4e | Post-results services | Delete reference to enquiries about results and replace with review of results |
| February 2021 | 1.3 | | | Update to specification covers to meet digital accessibility standards |
| July 2021 | 1.4 | Multiple | Multiple | Updates to various hyperlinks throughout the specification Remove references to “new qualification” and similar. 6.03c - Higher tier content reworded. 7.01c - Content renamed. 11.02c - Statement about unassessed notation added to Foundation and Higher columns. |
| February 2023 | 1.5 | 3b | Total qualification time | Update to include Total qualification time and Guided learning hours (TQT/GLH) to comply with Qualifications in Wales regulations |
| February 2024 | 1.6 | 3c, 3d 4a Checklist | Qualification availability, Language Pre-assessment | Inclusion of disclaimer regarding availability and language Update to include resilience guidance Inclusion of Teach Cambridge |

YOUR CHECKLIST

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