Department for Education

Core maths qualifications: technical guidance

August 2018

Contents

1. Introduction

1.1 Scope

This document provides awarding organisations with the technical detail they need to submit new Level 3 qualifications for approval as 'Core Maths' for 2020 performance tables. This document also serves as notice to awarding organisations that the DfE will not be accepting new Core Maths qualifications after 30 November 2018. However, awarding organisations that intend to make revisions to existing qualifications after this date should notify the DfE as the DfE runs a process to evaluate existing qualifications.

Qualifications approved in 2014 for 2017 performance tables that have not been amended will count as Core Maths in future performance tables unless they are no longer available.

1.2 Background

In July 2014 the DfE published guidance setting out the characteristics that new qualifications should meet in order to count in 16-19 school and college performance tables from 2017 as 'Core Maths'. The introduction of this new category of qualifications for the purpose of performance tables was designed to address the issue of poor progression in mathematics from age 16 by offering an opportunity for students not studying AS or A level mathematics to study a Level 3 mathematics course alongside their main programme of study.

'Core Maths' is a performance table category which signifies mathematical qualifications suitable for those with a grade 4 or above in GCSE maths at age 16 who are not taking AS/A level maths or a Level 3 International Baccalaureate (IB) mathematics certificate as part of their 16-18 programme.

Core Maths qualifications will count within the proposed level three maths measure in 16-19 performance tables from 2017 and within the TechBacc performance measure from 2016[1]. Students successfully completing Core Maths along with at least one Tech Level qualification and the Extended Project will be recognised as having achieved the TechBacc from 2016.

In December 2014 the first tranche of Core Maths qualifications were announced[2] and early teaching of Core Maths began in 150 schools from autumn 2014 supported by the government-funded Core Maths Support Programme. Core Maths is now supported by the government-funded Advanced Maths Support Programme[3].

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[1] In addition to other mathematical qualifications see: www.gov.uk/government/publications/technical-baccalaureate-measure-for-16-to-19-year-olds

[2] https://www.gov.uk/government/news/launch-of-new-high-quality-post-16-maths-qualifications

[3] https://amsp.org.uk

2. Characteristics that Level 3 mathematical qualifications must demonstrate

2.1 Overview

In order to be counted as Core Maths in performance tables, Level 3 qualifications must:

- meet Ofqual's regulatory requirements contained in the General Conditions of Recognition;
- be approved under section 96 of the Learning and Skills Act 2000 for use with 16-19 year olds; and
- demonstrate the characteristics of Core Maths described below.

Characteristic	DfE role
Qualification Purpose	Expert panel to advise DfE
Size	Expert panel to advise DfE
Recognition	DfE to check
Content	Expert panel to advise DfE
Linear and Synoptic Assessment	Expert Panel to advise DfE
External Assessment	Expert Panel to advise DfE
Grading	Expert Panel to advise DfE

2.2 Qualification Purpose

Detail

The declared purpose of the qualification as set out in the specification must reflect the purpose described below in terms that are meaningful and relevant to students, parents, employers, post-16 providers and higher education institutions.

Core Maths qualifications should consolidate and build on students' mathematical understanding and develop further mathematical understanding and skills in the application of maths to authentic problems, thereby offering progression from GCSE mathematics. Qualifications should provide a sound basis for the mathematical demands

that students will face at university and within employment across a broad range of academic, professional and technical fields.

Core Maths courses should prepare students for the varied contexts they are likely to encounter in vocational and academic study and in future employment and life, for example, financial modelling and analysis of data trends. As such, Core Maths qualifications should foster the ability to think mathematically and to apply mathematical techniques to a variety of unfamiliar situations, questions and issues with confidence. While Core Maths is likely to be particularly valuable for students progressing to higher education courses with a distinct mathematical or statistical element such as psychology, geography, business and management, such qualifications will also be valuable for any student aiming for a career in a professional, creative or technical field.

Core Maths qualifications are distinct from AS and A level mathematics. The former extend students' experience of mathematical techniques significantly, developing advanced analysis of mathematical problems and construction of related arguments and methods of proof. Thus they are oriented in particular towards students wanting to progress into higher level study with a significant mathematical focus as well as being valuable for broader fields of study and work.

Justification for this characteristic

Qualifications in the Core Maths performance table category will not be regulated as a single qualification with specific conditions. Similarity of purpose will help ensure that qualifications in this category meet similar needs for students, employers, post-16 providers and HEIs.

A clear statement of purpose will help students make informed decisions, ensuring that they are fully aware of what the qualification offers.

How judgement will be reached

A statement of purpose should be included in the qualification specification. The expert panel will advise the DfE on the extent to which the stated purpose reflects the above and is met in the qualification.

2.3 Size

Detail

All regulated qualifications are required to have a value for Total Qualification Time and Guided Learning Hours assigned to them in accordance with Ofqual's Total Qualification Time Criteria.

In order to count in performance tables as Core Maths, qualifications should have allocated to them at least 180 Guided Learning Hours (GLH) and have a Total Qualification Time in excess of 180 hours.

Justification for this characteristic

Qualifications of this size should provide sufficient time to develop mathematical skills to a higher level. Demand from higher education is critical to the success of Core Maths. Qualifications with a minimum size of 180 GLH are more likely to have currency in higher education than smaller qualifications.

There is no upper limit on size set for performance tables as we do not want to restrict the amount of time spent developing mathematical skills.

How judgement will be reached

Awarding organisations identify the GLH and TQT value when they place a qualification onto the qualifications register. The GLH value for regulated qualifications is publicly available in Ofqual's Register of Regulated Qualifications and the TQT criteria is available on the Total Qualification Time Criteria publication. The expert panel will advise the DfE on the extent to which the size reflects the above and is met in the qualification.

2.4 Recognition

Detail

For new qualifications to count in performance tables it is essential that they prepare students for the mathematical demands of higher education and employment as set out under 'Declaration of Purpose' above.

In due course we expect Core Maths qualifications to be recognised as conferring an advantage when students apply for jobs, training or higher education entry. At this stage we expect evidence of user support for each qualification and for the design of the qualification to be informed by employers, recognised learned and professional bodies and higher education institutions (HEIs).

This input should extend beyond mathematical subject expertise. It should reflect a range of higher education subjects and professional areas which are relevant to the student group.

Justification for this characteristic

Many entrants to university and employment do not have the mathematical skills expected of them[4]. Employers, recognised learned and professional bodies and universities are well placed to advise awarding organisations on expectations for students and on applications of maths which are relevant to Core Maths curricula and teaching.

How judgement will be reached

As part of the submission to DfE for review, awarding organisations should provide six letters in total covering a range of stakeholders, for example employers[5], HEI departments and professional or learned bodies, confirming that they support introduction of the qualification as designed and/or that their organisation has provided input to the design of the qualification.

Letters should refer to the specific qualification and be published alongside the qualification specification on the awarding organisation's website following submission to the register[6].

2.5 Content

Detail

In order to count in 2020 performance tables as Core Maths, new qualifications must reflect qualification objectives and related guidance on content set out below.

Objective 1: Deepen competence in the selection and use of mathematical methods and techniques.

Guidance – we would expect students to be able to:

- Use a range of mathematical methods and techniques reflected in higher tier GCSE mathematics[7] to find solutions to mathematical and non-mathematical problems. This includes elements content for more highly attaining students highlighted in bold.
    - We expect techniques and methods to reflect a range of GCSE content areas, so these should be drawn from at least four of: Number; Algebra;

[4] ACME (2011) Mathematical Needs Mathematics: Mathematics in the workplace and in Higher Education

[5] Employers should be representative of industry sector or occupational group.

[6] Awarding organisation name, qualification title and QAN.

[7] Content highlighted in underline and bold in GCSE mathematics subject content and assessment objectives published by the department on 1 November 2013.

Ratio, Proportion and rates of change; Geometry and measure; Probability; and Statistics.
    - This is not a broad 'recap' of GCSE content – the focus should be on a set of a carefully selected and challenging methods and techniques that make sense in the context of qualification purpose.
    - It is assumed that students will already have confidence and competence in the content presented in standard and underlined type within the GCSE mathematics subject content. Students will make use of elements of this content when addressing problems within Core Maths but we do not expect these to be explicitly set out in qualification content.

- Understand a further set of more challenging mathematical concepts and techniques drawn from beyond GCSE which are relevant within technical, professional and/or academic contexts. A minimum of 20 per cent of overall assessment should be based on these, which can be drawn from AS/A level mathematics and/or other areas.
- Make decisions about which methods and techniques from GCSE mathematics and beyond are best used to understand and address specific problems; Use techniques correctly to generate answers and solutions and interpret and explain these in the context of the problem.

Objective 2: Develop confidence in representing and analysing authentic situations mathematically and in applying mathematics to address related questions and issues.

Guidance – we would expect students to be able to:

- Use a variety of mathematical and statistical approaches to represent and analyse relatively well-defined situations, including complex and unfamiliar situations. This includes identifying and understanding quantifiable information and related assumptions in that situation, using mathematical and statistical representations and techniques appropriately, and deriving new information to draw meaningful conclusions about the situation.
    - Situations and problems should be drawn from physical/technical/scientific and human/behavioural/social domains and reflect a range of contexts including professional and academic settings.
    - Mathematical methods and techniques should reflect those outlined under the first objective.

- Address authentic issues and questions by applying mathematical approaches with purpose to generate solutions, insights or answers. Evaluate the relevance of solutions in the context of the situation, establish how they could be used and communicate findings accurately and meaningfully.

Objective 3: Build skills in mathematical thinking, reasoning and communication.

Guidance – we would expect students to be able to:

- Generate and apply mathematical solutions to non-routine questions and problems: interpret new situations in terms of mathematical and quantitative characteristics; make judgements about strategies and methods to achieve a solution; take creative approaches where appropriate; and test and evaluate answers and conclusions.
    - Non-routine problems are those where specific methods and solutions are not immediately obvious because there may be limited, ambiguous or contradictory information; they require judgements or assumptions to be made and may not lead to a single or clear answer. Solving non-routine problems is likely to call on creative strategies, draw on broader knowledge and understanding, require more general discursive and problem-solving skills and demand reasoning about mathematical information and methods.

- Explain mathematical reasoning and conclusions to others and justify specific approaches taken to the problem. Interpret conclusions on the basis of mathematical understanding and explain limitations to answers and conclusions.
- Weighting of the objectives above in qualification assessment should reflect the purpose of Core Maths qualifications as set out in section 2.2. Both objectives 2 and 3 should each have greater weighting in content than objective 1.

Justification for this characteristic

A variety of organisations including learned societies, mathematics education organisations and higher education bodies responded to our consultation[8] with the message that the we should specify the content of qualifications in more detail than proposed in our January 2014 policy statement.

The guidance above offers a degree of freedom in the mathematical content of new qualifications but sets out how this supports outcomes that we expect to be reflected in all qualifications.

Greater commonality of content will help employers, schools, post-16 providers and higher education institutions (HEIs) to be sure that qualifications counted in performance tables meet particular objectives and that expectations of students reflect the purpose of the qualification.

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8 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/327974/Core_Maths_Technical_Guidance_-_Consultation_response_July_2014_-_Amended__PT_.pdf

How judgement will be reached

Awarding organisations will set out content in qualification specifications submitted for review by DfE. Following review, specifications will be published.

The DfE will convene a panel of mathematics experts to confirm whether qualification content, as set out in specifications for each submitted qualification, reflects the 'content' guidance presented above. We will ensure that the Panel as a whole will reflect a skillset which is appropriate to Core Maths.

2.6 Linear and synoptic assessment

Detail

All Core Maths qualifications should be linear, with assessments that count towards grading taking place at the end of the course of study. This will allow students the opportunity to develop their understanding of the subject over a period of time.

All qualifications should include a significant element of synoptic assessment. This requires a candidate to identify and use effectively in an integrated way an appropriate selection of skills, techniques, concepts, theories, and knowledge from across the course content.

Justification for this characteristic

The ability to secure consistent year-on-year standards at the qualification level is difficult when assessments are taken at different points during a two-year course and students build up their qualification as each module is graded.

Synoptic assessment is vital to the level of challenge for students as it requires breadth of knowledge, skills and understanding. It is essential that students become aware of the interconnectivity of mathematical ideas and that coherence is offered across the qualification.

How judgement will be reached

The DfE will confirm whether the requirement for linear assessment has been met.

The contribution that synoptic assessment provides to the final award should be of sufficient size to cover the range of qualification content meaningfully. For Core Maths qualifications a minimum of 25 per cent of qualification assessment should be synoptic.

A statement describing how the requirement for synoptic assessment is met should be included as additional information when submitting the qualification to DfE for review. The DfE will check whether the assessment reflects the statement provided.

2.7 External assessment

Detail

Safeguarding standards of qualification assessment is the responsibility of Ofqual, the Independent Regulator.

The DfE will require:

- A minimum of 80 per cent of the overall grade to be based on external examination assessment;
- Any internal assessments to be subject to external moderation;

Repeat submission of written coursework for summative assessment is not allowed.

Justification for this characteristic

Qualifications that count towards performance tables should demonstrate rigour and a comparable level of challenge to other academic qualifications, and should therefore have an appropriate amount of content that is subject to external assessment. External assessment also provides an additional check that standards are consistent across centres.

Coursework may play a role in the assessment of Core Maths qualifications. To ensure that the submission of written coursework provides sufficient challenge, repeat submission will not be allowed. That is, if a coursework assessment has been made, students will not be allowed to re-submit any further coursework to improve that mark.

How judgement will be reached

Awarding organisations should ensure that the specification contains sufficient detail for a judgement to be made. This should include information about the knowledge, understanding and skills that will be assessed, as well as details of the arrangement for assessment. The total proportion of qualification content that is subject to external assessment should match the contribution made to the overall grade.

The DfE will decide on whether Core Maths performance table requirements for external and for final exam assessment have been met.

2.8 Grading

Detail

Qualifications must be graded using a detailed structure which differentiates the performance of students and enables excellent achievement to be recognised. Grading must apply to the overall qualification.

Justification for this characteristic

This is important for student motivation to differentiate between the results of different candidates and to ensure there is sufficient rigour in the qualification assessment in order to provide confidence for students, employers, post-16 providers and HEIs.

How judgement will be reached

Attainment that is sufficient to lead to the award of the qualification should be reported on a scale which has a minimum of four grades. The grading/mark scheme must be set out in the qualification specification submitted to the DfE. It must explain how final grades are derived from assessments.

3. Entry routes into the 2020 performance tables

3.1 The process

Qualifications will be eligible for consideration as Core Maths in 2020 performance tables if they are regulated qualifications which are approved under section 96 of the Learning and Skills Act 2000 for use with 16-19 year olds.

They will fall into one of the following categories:

> Category A: Qualifications already approved as Core Maths for inclusion in 2019 performance tables that have not been amended.
>
> NB Any qualification that will no longer be available to students starting Key Stage 5 in September 2018 will not be recognised in the 2020 performance tables. Awarding organisations will need to notify DfE of any change to the status of such qualifications.
>
> Category B: New or redeveloped qualifications that appear on Ofqual's Register of Regulated Qualifications.
>
> Awarding organisations should propose in writing by **31 August 2018** that they intend to submit such a qualification for evaluation by DfE against Core Maths requirements – to: mathsstandards.MAILBOX@education.gov.uk.

The deadline for formal submission to DfE for consideration as Core Maths qualifications is **31 October 2018**. This will be via a short form which DfE will send out to awarding organisations that have expressed an intention to submit a qualification.

The DfE and expert panel will check information on each regulated qualification covering the characteristics as set out in section 2.

3.2 Notification of outcomes

Awarding organisations will be notified of outcomes for their qualifications in advance of publication of the 2020 performance tables list at the end of November 2018.

3.3 Review of decisions

Awarding organisations will have the opportunity to request reviews of decisions if they disagree with the evaluation decision. The deadline for doing this will be 25 January 2019. Evidence will be considered a second time by an independent reviewer who was not involved in the original assessment. Subsequent amendments to the list of qualifications to be included in the 2020 performance tables will be made by the end of February 2019.

4. Key dates

Date	Activity
31 August 2018	Latest deadline for awarding organisations to inform DfE of the intention to submit a new or redeveloped qualification for consideration for 2020 performance tables. We encourage awarding organisations to inform us sooner of their intention to submit qualifications.
31 October 2018	Latest deadline for awarding organisations to submit regulated qualifications for consideration against DfE Core Maths performance table criteria.
December 2018	Publication of the full list of Level 3 qualifications that will count in 2020 performance tables as Core Maths.
25 January 2019	Deadline for awarding organisations to request a review of decisions about 2020 performance tables.
By 22 February 2019	Amendment of the list of Core Maths qualifications for 2020 performance tables if required following the review process.

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