Department for Education

Core maths qualifications: technical guidance

July 2014

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1. Introduction

1.1 Overview

This document provides awarding organisations with the technical detail they need to submit Level 3 qualifications for approval as Core Maths qualifications, to count in 2017 16-19 performance tables.

1.2 Background

On 6 January the DfE published a policy statement on the introduction of Core Maths qualifications, proposing characteristics that new qualifications should meet in order to be counted in 16-19 school and college performance tables from 2017 as a 'level 3 maths' qualification. Since then the DfE has consulted a large number of organisations including 16-19 sector bodies, employer organisations, learned and professional societies, awarding organisations and higher education bodies to inform the development of formal guidance on new qualifications.

The introduction of new qualifications is designed to address the issue of poor progression in mathematics from age 16. At the moment 40 per cent of students (around 250,000 each year in total) achieve a grade C or above at GCSE but do not progress in maths beyond age 16.

Students without a grade C or above in GCSE maths at age 16 are now required to continue studying towards the qualification as a condition of funding (from September 2014), but there is still a large group of students with at least a C grade who do not continue with maths. This has long been recognised as a problem in relation to the mathematical demands of higher education and employment.

In December 2013 the DfE launched a consultation setting out proposed improvements to 16-19 education and training accountability arrangement. The consultation included proposals for an additional measure for school and college performance tables showing the percentage students with GCSE mathematics at A*-C at the end of Key Stage 4 that have gone on to take an approved level 3 maths qualification – the 'Level 3 maths measure'. The proposal is for AS and A Level maths and International Baccalaureate level 3 maths certificates to count against this measure, and for approved 'Core Maths' qualifications to count as they become available.

1.3 Core Maths qualifications

'Core Maths' is a performance table qualification category which signifies mathematical qualifications suitable for the 'middle group' of students – those with a grade C or above in GCSE maths at age 16 who are not taking AS/A level maths or International Baccalaureate (IB) maths 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[1].

Students successfully completing Core Maths along with at least one Tech Level qualification and the Extended Project as part of a DfE “early adopters” project starting in 2014/15, will be recognised as having achieved the TechBacc measure in 2016.

The ‘middle group’ of students includes those on the range of level three 16-18 programmes in schools, sixth form colleges and FE colleges - covering A level and technical/vocational studies (the latter representing around 37 per cent of this group). The large majority of these students have a grade B or grade C in GCSE maths, but a significant proportion have an A or A*. Around one third of students taking A levels (not including AS/A level maths) for example have a grade A or A* in GCSE maths.

New qualifications are being developed by awarding organisations to address the needs of this group, and the first of these will be submitted for accreditation in summer 2014. Our intention is to evaluate new qualifications in autumn 2014 against Core Maths requirements set out in this guidance. Qualifications meeting the performance table requirement will be counted in 2017 performance measures (published in early 2018).

Beyond 2014 the Government will introduce an annual process to evaluate new or redeveloped qualifications and will publish a list of Core Maths qualifications in November each year. From 2018 (i.e. qualifications to be included in 2021 tables) we plan to add a requirement on awarding organisations relating to their qualification track record, requiring evidence of participation by a certain number of students and centres - to be determined based on overall take-up of qualifications at that point.

1.4 Revisions to GCSE maths and A levels

Revised GCSE mathematics criteria were published in December 2013. Awarding Organisations will publish new GCSE maths qualification specifications based on these in autumn 2014 for first teaching in September 2015. Therefore, students participating in early adopter trials of Core Maths (2014-16) and the first two years of general teaching (2015-17 and 2016-18) will have studied the current maths GCSE. All sixteen year olds starting Core Maths from 2017 will have studied the new mathematics GCSE.

Given the need for longevity, the new GCSE will be taken as the benchmark for progression to Core Maths. Before starting Core Maths courses students may value refreshing their GCSE mathematics knowledge. The needs of students in this respect may differ for the first Core Maths cohorts compared to later ones.

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

Revised A levels will be introduced for first teaching in 2015 and 2016. A levels being introduced in 2015 include the sciences, history, psychology, business studies, computing and, in 2016, geography - all of which likely to have strengthened mathematical content. The emphasis in these cases will be on subject-relevant mathematics, including statistics. While there may be some cross-over in focus with Core Maths content, the latter will build a broader base of mathematical understanding and skills. Where there is crossover, situations and problems will differ, encouraging reflection and reinforcement of skills.

Revised A level mathematics and further mathematics qualifications will be introduced in 2016. These will be distinct from Core Maths in purpose and target group. We do not anticipate that students taking mathematics A or AS levels will also take Core Maths. Further information of the difference between these level three qualifications is outlined under ‘Qualification purpose’ in section 2.

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:

- be accredited by Ofqual;
- 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.

Accreditation of qualifications by Ofqual and the evaluation of qualifications for performance tables by DfE are separate processes, operating to differing requirements.

Awarding organisations will be required to secure Ofqual accreditation before their qualification is formally submitted for consideration by DfE as Core Maths in performance tables.

DfE will be responsible for decisions about whether qualifications meet Core Maths requirements. In order to streamline the overall process, DfE and Ofqual have agreed that awarding organisations should provide a single set of information to Ofqual when submitting qualifications for accreditation. Ofqual will pass information and advice to the DfE on relevant characteristics to support the evaluation of qualifications against performance table requirements once they are accredited.

Awarding organisations should submit evidence for Core Maths performance table characteristics listed in the table below when submitting qualifications to Ofqual for accreditation.

Characteristic	**Ofqual/DfE role**
Qualification Purpose	Ofqual to check, for advice to DfE
Size	Ofqual to confirm
Recognition	Ofqual to check, for advice to DfE
Content	Expert panel to advise DfE
Linear and Synoptic Assessment	Ofqual to confirm
External Assessment	Ofqual to confirm
Grading	Ofqual to confirm

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 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 A and AS level mathematics. The latter 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. Ofqual 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

In order to count in the 2017 performance tables as Core Maths, it must be at least 180 Guided Learning Hours (GLH).

Ofqual intends to introduce new conditions on GLH. Until that time, and for the purposes of the 16-19 performance tables, we will continue to use the GLH measure.

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 value when a qualification is submitted for accreditation by Ofqual. Ofqual will confirm qualification size. The GLH value for accredited qualifications is publicly available in Ofqual's Register of Regulated Qualifications.

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[2]. 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 Ofqual for accreditation, awarding organisations should provide six letters in total covering a range of stakeholders, for example employers[3], 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 accreditation[4].

2.5 Content

Detail

In order to count in 2017 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[5] 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; Ratio, Proportion and rates of change; Geometry and measure; Probability; and Statistics.

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

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

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

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

    - 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 type within GCSE mathematics criteria. 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 A/AS 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 have responded to our recent consultation 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.

How judgement will be reached

Awarding organisations will set out content in qualification specifications submitted for accreditation by Ofqual. Following accreditation 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

Ofqual will provide confirmation to the DfE on 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 Ofqual for accreditation. Ofqual will check whether the assessment reflects the statement provided and provide advice to the DfE on this aspect.

2.7 External assessment

Detail

Safeguarding standards of qualification assessment is the responsibility of Ofqual, the Independent Regulator. Ofqual's definition of external assessment, against which all qualifications will be considered, is:

"A form of independent assessment in which question papers, assignments and tasks are set by the awarding organisation, taken under specified conditions (including details of supervision and duration) and marked by the awarding organisation."[6]

We 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.

Ofqual will provide information for DfE on whether Core Maths performance table requirements for external and for final exam assessment have been met.

[6] Ofqual. Regulatory arrangements for component and Diploma awarding bodies, March 2010 http://comment.ofqual.gov.uk/diploma-operating-rules/part-2/operating-rules-for-principal-learning-and-project-component-awarding-bodies/section-3-assessment-of-principal-learning-and-the-project

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 Ofqual for accreditation. It must explain how final grades are derived from assessments.

3. The process for approving accredited qualifications

3.1 The process

Qualifications will be eligible for consideration as Core Maths in 2017 performance tables if they are level 3 qualifications accredited by Ofqual before 13 October 2014 and are approved under section 96 of the Learning and Skills Act 2000 for use with 16-19 year olds.

Awarding organisations should propose in writing by **11 August 2014** at the latest, for each relevant qualification, that they intend to submit this for evaluation by DfE against Core Maths requirements. Qualifications should have been submitted to Ofqual for accreditation by **11 August 2014** and all relevant information should provided to Ofqual at that point.

Ofqual will publish further details about the overall process shortly, including the information awarding organisations should submit for both accreditation and for consideration as Core Maths in performance tables.

The deadline for formal submission to DfE for consideration as Core Maths is **13 October 2014**. This will be via a short form which DfE will send out to awarding organisations to complete.

Ofqual will provide information or advice as relevant for each qualification to DfE covering the characteristics as set out in section 2.

The assessment of qualification content (section 2.5) against the requirement will be undertaken by a panel of mathematics experts convened by DfE.

The Department will run an annual process in the autumn term to consider new qualifications against the Core Maths standard if they become available.

3.2 Notification of outcomes

Awarding organisations will be notified of outcomes for their qualifications in advance of publication of the 2017 performance tables list at the end of November 2014.

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 5 December 2014. 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 2017 performance tables will be made by the end of January 2015.

4. Key dates

Date	Activity
11 August 2014	Latest deadline for awarding organisations to inform DfE of the intention to submit specific qualifications for consideration for 2017 performance tables. We encourage awarding organisations to inform us sooner of their intention to submit qualifications.
13 October 2014	Latest deadline for awarding organisations to submit accredited qualifications for consideration against DfE Core Maths performance table criteria.
End November 2014	Publication of the list of Level 3 qualifications that will count in 2017 performance tables as Core Maths.
5 December 2014	Deadline for awarding organisations to request a review of decisions about 2017 performance tables
31 January 2015	Amendments to the list of Core Maths qualifications for 2017 performance tables if required following the review process.
Summer 2017	First general Core Maths qualification assessments.
January 2018	First reporting of qualifications demonstrating the requirement (the 2017 performance tables).

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