July 2016

Exam Boards Answer Questions About the New GCSE

On behalf of the Maths Hubs network, two Maths Hub Leads, Dean Rowley (Norfolk and Suffolk Maths Hub) and Matthew Linney (North Mids and Peaks Maths Hub) met representatives from the three main exam boards in the 2016 summer term. With a focus on the new GCSE (first exams summer 2017), Dean and Matthew collected questions that teachers felt were particularly pressing, and put the questions to the representatives. The document below compiles their answers, with useful links:

CPD

	AQA	OCR	Edexcel
Do you have a web site dedicated to CPD and what CPD do you currently run for the new GCSE?	Free online training is available with "GCSE Mathematics: Getting Started". Bespoke and free face-to-face support is available from AQA Maths Advocates for example to help teachers with the reasoning and problem solving element at KS4. There is a PD tab available and there are both face-to-face and webinar training sessions. Some of these are free and have previously included teaching and learning, pedagogy, KS1/2, aspiring HODs and subject knowledge enhancement.	The CPD Hub for OCR qualifications shows where upcoming courses can be booked on to and has documents from past courses. Its dedicated GCSE (9-1) Maths page offers courses on planning for the qualification (for delivery over 1 or 2 years), problem solving, new foundation and higher tier content, co-teaching GCSE (9-1) Maths with the Additional Maths FSMQ, webinars and past paper reviews.	Both free and paid-for CPD can be accessed via Training from Pearson, where you can find a wide variety of online and face-to-face events. If you missed or could not attend one of our face to face launch events or online content sessions, you can still access presentations and listen to the recordings. Introduced in 2013, The Mathematics Collaborative Networks are free local teaching networks introduced to help support, train and share best practice with maths teachers and heads of department across the country. Network meetings run throughout the year on a termly basis in over 40 hub centres.
Do you have any further tips and	Problem solving should be embedded in all the work candidates undertake	The AO1-AO3 guidance available in a document from Ofqual defines how	We offer the following support for problem solving:

| guidance on how to deliver the problem solving element of the new GCSE? | and it is beneficial to develop resilience at an early stage. AQA maths advocates can help support teachers in the delivery of this. We have documents on our All About Maths resources site that can support the development of problem solving skills and more will be added by September. Exampro can be used as a resource to support problem solving by selecting relevant questions. Previous coursework tasks may also support the development of problem solving skills. Our legacy Additional Maths Specification contained a significant problem solving element and the papers can all be found on All About Maths. | problem solving will be assessed in GCSE (9-1) Maths. The strands of AO3 reflect stages of a 'problem solving cycle', from translating problems out of contexts into processes and/or using different areas of maths together (for instance, algebra within geometry) to interpreting results and then evaluating. At least 1/3 of AO3 marks will be allocated to tasks which involved two or more strands of AO3. Students should be given experience of each AO3 element through rich problem solving tasks. We offer CPD focused on problem solving and how it can be delivered in a typical lesson. The OCR GCSE (9-1) Maths Specification breaks down the original DfE wording and presents it in a unique three-column grid structure, so initial and underlying content can be clearly seen, enabling skills to be built up as appropriate to ability with the content area. Resources including problem solving questions (such as the 'Check In tests') are available from the OCR GCSE (9-1) Maths webpage for each column of the content. | • Practice papers - Gold/Silver/Bronze practice papers are sets of problem-solving (AO3) papers using questions taken from our original and new SAMs, specimen papers set 1 and specimen papers set 2. These papers comprise questions with varying degrees of scaffolding and are designed to boost student confidence in tackling problem-solving questions.
• Trial support materials – which include exemplar student answers with examiner comments, tiering guidance, an introduction to the new problem-solving requirements and strategies for tackling the questions, exemplification of the new AO3 strands, problem-solving strategy posters, model answers and Exam Wizard AO3 tests and exemplification of the new AO2 strands and Exam Wizard AO2 tests.
• Schemes of work – editable three-year, two-year and one-year resit schemes of work to support delivery of the new GCSE Mathematics (9–1) at each tier with opportunities for reasoning and problem-solving in each sub-unit. Also available are five year-schemes of work to cover KS3 and KS4 and including content provided for |

			free by publishers. - Teaching guidance – comprehensive guidance on the new specification points, drawing together both new information and information provided in other documents. This includes examiner comments, content new to GCSE (9–1) and new to foundation tier, mapping to 1MA0, learning objectives, selected questions from the new SAMs and specimen papers, and Exam Wizard topics. - Published resources- clear links to problem solving, mastery and fluency. - Mathematics Collaborative Networks- problem solving as well as many teaching and learning approaches are discussed among participants and our credible specialists.
What do you imagine problem solving at KS3 to look like if it is to prepare students for the new GCSE?	Ideas for supporting Problem Solving at KS3 can be found in our KS3/4 Bridging the Gap documents, both in Section 4 of the Teacher Guide and within each of the 9 pockets.	The three-column structure of the OCR GCSE (9-1) Maths Specification has enabled us to specifically present a column of 'Initial Learning' content. The content in this column is not anything extra to the DfE content, it is all required GCSE (9-1) content, but as well as appearing on the GCSE (9-1) content these topics also appear on and overlap with KS3 content. OCR resources based on this column of content could therefore be used to deliver the	We offer the following support for KS3: - KS3 tests – our colleagues in publishing have provided KS3 baseline, end of term and end of year tests for a three-year KS3 and at three levels of attainment. Answers are included, along with objectives and progression steps for each question. - Published resources with clear links to problem solving, mastery and fluency.

		content to KS3 students. The 'Check In tests' based on this column of content each contain several AO3 problem solving questions that could be used with students at this level to prepare them for the GCSE (9-1).	
What kind of support do you offer on the problem solving element of the new GCSE?	Please see above	We have CPD on problem solving in GCSE (9-1) Maths. Full details are available on the CPD Hub. Resources including problem solving questions (such as the 'Check In tests') are available from the OCR GCSE (9-1) Maths webpage for each level of the content and even more are forthcoming. The Delivery Guides for the qualification include links to a number of different resources, including those focussing on 'conceptual' and 'contextual' tasks that would help develop students' skills in problem solving. We have noted the Assessment Objectives within the mark schemes for every question in the Sample Assessment Materials and Practice Papers, so teachers can see which questions focus on elements of problem solving.	Please see above
Are there any ways you are working with teachers/aspiring teachers e.g work with LAs, sub groups etc. (In addition to	Advocates are working to support NQTs and staff delivering GCSE mathematics for the first time. Our route maps come complete with lesson plans, homework sheets, topic tests and an e-Library that can be used by any teacher but may be of particular use to non-specialists.	We run termly teacher networks discussing maths teaching and qualifications, with all teachers welcome to attend. We have also attended and presented at a variety of LA, Maths Hub and regional group sessions and workshops on the new GCSE (9-1) qualification and we look forward to this	Introduced in 2013, the Mathematics Collaborative Networks are free local teaching networks introduced to help support, train and share best practice with maths teachers and heads of department across the country. Network meetings run throughout the year on a termly basis in over 40 hub centres.

TSST, ITT, SCITT etc)		continuing. With the creation of materials for the qualification (specifications, resources, &c.), we frequently work with current teachers to ensure they are best set out for new teachers and non-specialist maths teachers. The grid structure of our OCR GCSE (9-1) Maths Specification is an example, showing how we have taken the content and considered how best to present it in a form that can be used to prepare for delivery, rather than just repeating the original DfE content strands.	We support and deliver sessions in many conferences (including NCETM Hub conferences and events) and LA events.
What support can you offer us to help us make predictions about students' likely outcome so that we can strategically target intervention?	The trialling of papers is now underway. Thousands of students currently at the end of Year 10 will help to inform us about performance at that stage. It is hoped that this data will be shared at a later date. A third set of practice papers, refined as a result of this Year 10 trial, will be available for schools to undertake mock examinations in the autumn of 2016. We hope to share performance data from this so that teachers can see where their students lie within a large cohort, as well as learn about topics or areas where there is room for improvement. The papers will be available here.	'Check In tests' are available at three different content demands (based on the three columns structure of our OCR GCSE (9-1) Maths Specification) in many different content areas. Each includes 10 questions (across AO1/AO2/AO3) on a tightly focussed topic that can be used to see how well students are prepared for the content at each tier. The final grades will be based on proportional statistics from Ofqual and so, at the present time, it is not possible to state likely outcomes with confidence.	ResultsPlus is a free online results analysis tool for teachers that gives you a detailed breakdown of your students' performance in Edexcel exams. Practice tests – sets of practice tests, comprising both three 80 mark papers and six 40 mark papers at each tier, with mark schemes and national average performance data, have been created by putting together questions from past GCSE, Linked Pair Pilot and IGCSE papers (adding newly written questions to cover new content whenever required) to mirror the demands of the new GCSE Mathematics (9-1) papers.

Grading system

	AQA	OCR	Edexcel
Can you offer any guidance as to what the most challenging questions will look like?	50% of the questions will be targeted at grades 7-9 on the higher specification. Questions can become more challenging by the way they are presented, so it is impossible to define a grade 9 topic though there are certainly questions intended to differentiate at that grade. For example, Pythagoras' theorem could be made more challenging with the introduction of surds or by linking it with algebra or placing it in a problem solving situation. All these approaches may add demand to the treatment of any topic.	At the time of writing (early summer 2016), Ofqual is yet to report on the outcome of their consultation into how grade 9 will be set. However, 50% of the questions on the higher tier are required to be grades 7-9. All GCSE (9-1) content could feature in grade 9 questions, since topics can be assessed at increased demands by the way they are assessed within a question. For example, by introducing problem solving, reasoning, large numbers, fractions, surds, complex formulae, etc. a question on 'basic' content could be quite challenging. For indications of how such questions may look, I would suggest downloading the Sample Assessment Materials and Practice Papers available from the OCR GCSE (9-1) Maths webpage and taking a look at the questions towards the end of the higher tier papers.	These would be expected to be found at the end of assessment. A resource package of series of the new content topics (exemplifications, newly written questions, problem solving approaches and extension questions) are being written and will be available in September 2016. Those will include topics new to Higher tier, some of which appear in the bold content specified by the DfE.
Can you offer any guidance as to the grade boundaries?	Our understanding is that Grade 5 will be set arithmetically to cover a range equivalent to the upper third of current grade C and the lower third of current grade B. This has been defined as a good pass by the Department for Education. We won't be issuing grade boundaries	Ofqual has stated that for awarding the new numbered grades in 2017: • broadly the same proportion of students will achieve a grade 4 and above as currently achieve a grade C and above	The grading guidance provided by the DfE is as follows: • broadly the same proportion of students will achieve a grade 4 and above as currently achieve a grade C and above

	until August 2017 but we hope teachers will be able to use the data from the trials, detailed above, to make their own inferences.	• broadly the same proportion of students will achieve a grade 7 and above as currently achieve a grade A and above • the bottom of grade 1 will be aligned with the bottom of grade G • grade 5 will be awarded to around the top third of students gaining the equivalent of a grade C and bottom third of a grade B. This has been defined as a good pass by the Department for Education	• broadly the same proportion of students will achieve a grade 7 and above as currently achieve a grade A and above • the bottom of grade 1 will be aligned with the bottom of grade G • grade 5 will be awarded to around the top third of students gaining the equivalent of a grade C and bottom third of a grade B. This has been defined as a good pass by the Department for Education
How about the grade 3,4,5 borderline?	More guidance to come on this. The first half of the foundation tier papers are intended to target grades 1 to 3 with the second half targeting grades 3 to 5. What we cannot know is how well a borderline student will perform on each half of the paper. It is also worth noting that all questions on the higher tier will be targeted at grade 4 upwards, with half the papers targeting grades 7 to 9. This compares to the legacy linear specification, where approximately 20% of questions on the Higher Tier target grade D (below grade 4).	The grades between 1, 4 and 7 will be awarded arithmetically so that the grade boundaries are equally spaced in terms of marks from neighbouring grades. It is currently not possible to say where the borderlines are going to be. At the foundation tier, half of the marks are required to be grades 1-3 and the other half 3-5 (at the higher tier, half of the marks are required to be grades 4-6 and the other half 7-9). In the three-column framework of the OCR GCSE (9-1) Maths Specification, the first 'Initial Learning…' column contains content that would be addressed in the grade 1-3 questions in the first half of each Foundation paper, while the second	Questions are targeted at grades 1–5 at Foundation tier and at grades 4–9 at Higher tier. Students who fall slightly below the grade 4 boundary on higher tier may be awarded a grade 3 but no grade 3 content will be assessed on that tier. Grades 4 and 5 are the overlap grades between Foundation and higher tiers. Common questions targeted at these grades will appear towards the end of foundation and at the start of higher papers respectively (those questions will be identical and in the same order). At least 20% of the marks available in each paper are allocated to the common questions.

		'foundation tier…' column introduces content that would start to appear in questions at grade 4 and above. This can be taken into consideration when constructing schemes of work and planning lessons – if students are not confident with content from the first column it is likely to be challenging to introduce the topics following on in the second column. Also note that students can still be awarded a grade 3 on the higher tier if they miss the grade 4 boundary by a 'small number of marks', although in terms of demand the question papers are to begin at grade 4.	Common questions papers have been put together by extracting questions that appear in both tiers from our new SAMs, specimen papers set 1 and specimen papers set 2. They can be used, for example, as part of considering tier of entry options. They can be accessed as part of the Trial support materials alongside tiering guidance.

Resources

	AQA	OCR	Edexcel
Do you have a textbook(s) which are aligned to your examination board?	Currently those produced by Collins, CUP and OUP have been verified by AQA. More detail can be found here.	There are two publishers who have produced materials for our specification, Cambridge University Press and Hodder. Cambridge University Press has published two (foundation and higher) books based on the content, while Hodder has broken it into three (foundation, overlap content and higher). Cambridge University Press also offer free downloadable teacher resources,	Pearson offers a wide variety of published resources as well as a digital support package.

		schemes of work and have a formulae poster. Both publishers have also published (or are about to publish) homework books, problem solving books and revision books, which are available via the links above.	
Do you have any resources to support reasoning and problem solving?	Please see CPD section.	Resources including reasoning and problem solving questions (such as the 'Check In tests') are available from the OCR GCSE (9-1) Maths webpage for each level of the content and even more are forthcoming. We have noted the assessment objectives within the mark schemes for every question in the sample assessment materials and practice papers, so teachers can see which questions focus on elements of reasoning and/or problem solving.	Please see above.
Could you share a link to your GCSE specimen papers? Any others?	- specimen papers - two sets of practice papers that will be in-line with live papers - the third set of papers are being trialled with the current Year 10s and will be made available early in the autumn term including a more detailed mark scheme informed by the trial experience - A fourth set of papers will be released at a later date All of the above papers are, or will be,	We have two sets of papers to download straight from the OCR GCSE (9-1) Maths webpage, they can be found in the 'Assessment Materials' section. We also have a third set available to download securely (so students don't have access to them) via our Interchange site. These can be obtained from the 'Assessment Practice Materials' section of the OCR GCSE (9-1) Maths webpage. A fourth set of papers will be available for	- Sample Assessment Materials Issue 2 - Specimen papers set 1 - Specimen papers set 2 - Problem-solving practice papers (Gold/Silver/Bronze) - Common questions papers - Practice tests - Themed practice papers - Access to Foundation tier - Baseline tests - Topic tests - End of term tests (for KS4)

	made available on All About Maths.	secure download later in the year.	• KS3 tests Mock papers will be securely published in October 2016

Content

	AQA	OCR	Edexcel
Can you offer any guidance on the delivery of what was previously higher content to foundation students? (e.g. surds)	All About Maths has a big focus on this and provides numerous teacher resources. They have been developed by advocates and teachers and include lesson plans, homework sheets and assessments.	We have produced a number of resources available from the OCR GCSE (9-1) Maths webpage, targeting these new areas at the foundation tier. The 'Check In tests' target each area of content at different levels of demand, lesson elements give short activities on the content (the poster we produced looking at ways of memorising the required trigonometry values is also available from here as a book size version) and the transition guides that have been produced look at the delivery	Recordings of online sessions dedicated to teaching and learning approaches for the new content of the new GCSE mathematics (new to foundation, higher and qualification) which ran early this year. A resource package of a series of the new content topics (exemplifications, newly written questions, problem solving approaches and extension questions) are being written and will be available in September 2016. New content topics are very often a discussion point during

of content between different stages. The 'Specification mapping document' highlights content changes between the new specification and the previous GCSE Mathematics B (J567) specification. We have written a blog on how these content changes have come about.

our Collaborative Network meetings, where teachers can share their approaches and draw on the experience of credible specialists.

Additional

	AQA	OCR	Edexcel
How can we best support GCSE retake students? Who will have to retake? What more can the exam boards offer?	A one year SOL is available on the key areas that differentiate grades 3/4 and 4/5. Training is also available to support a one year GCSE through Julia Smith. Currently, the DfE have stated that those who gain a grade 4 do not need to retake for the first two years, but in 2019 the threshold will move to a grade 5. Also, the legacy A* to G qualifications will be available as a resit only in November 2016 and summer 2017	Targeted resources will come out for this at a later date; current indications are that most resit students in summer 2017 will retake the legacy specifications rather than the new GCSE (9-1) maths. The maths 16-19 funding conditions indicate that the retake grade will be phased from grade 4 (in 17/18 & 18/19) to grade 5.	The official statement from the DfE is 'The 16-19 English and Maths funding condition will be adapted to reflect the new GCSE good pass. We will take a phased approach to give 16-19 providers time to prepare. For academic years 2017-18 and 2018-19 there will be a new 16-19 funding condition based on the new GCSE grade 4, which is equivalent to a C. Beyond this, the funding condition will be revised to reflect the new GCSE good pass (grade 5). The specific date from which this will take effect will be confirmed closer to the time.'

			Please visit [Edexcel GCSE Mathematics (9-1) from 2015 – post-16 resits](#) – page dedicated to support teachers delivering our new Edexcel GCSE (9-1) maths as a post-16 resit with resources and guides to aid one year delivery of the qualification.
How can exams assess students' mathematical thinking skills such as conjecturing, generalising and proving?	This will largely be covered by AO2. For instance: • arguments that lead to proof • making deductions from given information • critically analysing methods • reflecting on methods and solutions • finding errors • dealing with assumptions, which will be further developed at A' level	These skills will be assessed by the AO2 elements (30% of the marks at higher tier, 25% at foundation tier) for the new GCSE (9-1) Maths. We have noted the assessment objectives within the mark schemes for every question in the sample assessment materials and practice papers, so teachers can see which questions focus on assessing the various elements of reasoning.	Timed written examinations are not the best way to assess all mathematical skills; conjecturing, generalising and proving need to be covered as part of teaching and learning with a view to improving mathematical skill overall.
What is the future of GCSE Statistics? How does it fit with attainment/progress 8?	The first teaching of the new specification will be from September 2017, to be examined in 2019. This will be based on 100% examination and will count as one of the additional three subjects towards progress 8. We will be submitting to Ofqual on 11 August and the draft specification and specimen materials will appear on our website	GCSE statistics qualifications are being reformed for first teaching from autumn 2017 with first assessment in2019. The DfE's '[Progress 8 measure in 2016, 2017, and 2018](#)' document states GCSE statistics 'will be counted in a slot in the 'open' element of Progress 8 regardless of whether or not a pupil has also taken an EBacc mathematics qualification.'.	It will count as one of the additional three subjects towards progress 8. Controlled assessment will be removed for the 2019 examinations and will be 100% assessment across two tiers. This will be taught from September 2017.

	shortly after.		
What qualifications can I offer to stretch my most able mathematicians?	The Level 2 Further Maths qualification was originally intended to fill the gaps between the old GCSE and A level, and continues to be an option for the more able.	Our Level 3 Additional Maths FSMQ (6993) serves as a good introduction to, and as preparation for, AS/A Level mathematics. We also offer a Level 2 Foundations of Advanced Mathematics FSMQ (6989), for students interested in AS or A Level maths that need a bit more support in the transition, or for FE/HE students of other numerate subjects.	Edexcel Awards in Mathematics: Statistical Methods – Level 3 and Algebra – Level 3. These stand-alone qualifications are designed to help students develop proficiency in this area of maths. They fit in to the existing programme of delivery for mathematics in schools and colleges, helping students progress to GCSE, AS/A level, or further study. Both the Level 3 Edexcel Award in Algebra and in Statistical Methods are each worth 7 UCAS points.