

# How to respond to this consultation

The closing date for responses is **16 June 2016**.

Please respond to this consultation in one of three ways:

- complete the online response at <https://www.surveygizmo.com/s3/2726600/Setting-the-grade-standards-of-new-GCSEs-in-England-2017-2018>
- download the response from from <https://www.gov.uk/government/consultations/setting-the-grade-standards-of-new-gcses-in-england-2017-2018> and either:
  - email your response to [consultations@ofqual.gov.uk](mailto:consultations@ofqual.gov.uk) – please include the consultation title (*Setting the grade standards of new GCSEs in England – part 2*) in the subject line of the email and make clear who you are and in what capacity you are responding
  - post your response to: *Setting the grade standards of new GCSEs in England – part 2*, Ofqual, Spring Place, Herald Avenue, Coventry, CV5 6UB, making clear who you are and in what capacity you are responding

## Evaluating the responses

To evaluate responses properly, we need to know who is responding to the consultation and in what capacity. We will therefore only consider your response if you complete the information page.

Any personal data (such as your name, address and any other identifying information) will be processed in accordance with the Data Protection Act 1998 and our standard terms and conditions.

We will publish the evaluation of responses. Please note that we may publish all or part of your response unless you tell us (in your answer to the confidentiality question) that you want us to treat your response as confidential. If you tell us you wish your response to be treated as confidential, we will not include your details in any published list of respondents, although we may quote from your response anonymously.

**Please respond by 16 June 2016.**

# Responding to the consultation

## Your details

To evaluate responses properly, we need to know who is responding to the consultation and in what capacity. We will therefore only consider your response if you complete the following information section.

We will publish our evaluation of responses. Please note that we may publish all or part of your response unless you tell us (in your answer to the confidentiality question) that you want us to treat your response as confidential. If you tell us you wish your response to be treated as confidential, we will not include your details in any published list of respondents, although we may quote from your response anonymously.

Please answer all questions marked with a star\*

**Name\*** Charlie Stripp

**Position\*** Chief Executive

**Organisation name (if applicable)\*** Mathematics in Education and Industry (MEI)

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**Would you like us to treat your response as confidential?\***

If you answer yes, we will not include your details in any list of people or organisations that responded to the consultation.

Yes  No

**Is this a personal response or an official response on behalf of your organisation?\***

Personal response (please answer the question “If you ticked ‘Personal response’...”)

Official response (please answer the question “If you ticked ‘Official response’...”)

**If you ticked “Personal response”, which of the following are you?**

Student

Parent or carer

Teacher (but responding in a personal capacity)

Other, including general public (please state below)

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If you ticked “Official response”, please respond accordingly:

**Type of responding organisation\***

Awarding organisation

Local authority

School or college (please answer the question below)

Academy chain

Private training provider

University or other higher education institution

Employer

Other representative or interest group (please answer the question below)

**School or college type**

- Comprehensive or non-selective academy
  - State selective or selective academy
  - Independent
  - Special school
  - Further education college
  - Sixth form college
  - Other (please state below)
- 

**Type of representative group or interest group**

- Group of awarding organisations
- Union
- Employer or business representative group
- Subject association or learned society
- Equality organisation or group
- School, college or teacher representative group
- Other (please state below)

MEI is a charity and a membership organisation. It is an independent curriculum development body for mathematics. It is a major provider of mathematics teaching and learning resources, and of mathematics CPD for secondary school and post-16 mathematics teachers.

MEI developed and manages the DfE-funded Further Mathematics Support Programme and is a partner in the NCETM.

MEI developed the current OCR(MEI) suites of AS/A level Mathematics and Further Mathematics qualifications, and two Core Maths qualifications, which are administered by OCR.

**Nation\***

- England

Wales

Northern Ireland

Scotland

Other EU country: \_\_\_\_\_

Non-EU country: \_\_\_\_\_

**How did you find out about this consultation?**

Our newsletter or another one of our communications

Our website

Internet search

Other

\_\_\_\_\_

**May we contact you for further information?**

Yes    No

## Questions

**Proposal:** We are proposing that the first award of new GCSEs will be based primarily on statistical predictions, in order to protect the interests of students. Examiner judgement will play a secondary role as it will be, on the whole, less reliable.

Where the size and nature of the candidature means that statistical predictions are less reliable, a modified approach based on a wider range of information (including, for example, a greater reliance on examiner judgements) may be needed for the first award.

### Question 1:

**To what extent do you agree or disagree with our proposed approach to the first award of new GCSEs?**

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Please give reasons for your answer:

.....

.....

.....

**Proposal: We are proposing that we carry forward the grade standard established in the first award in subsequent years. This will be done through largely the same approach as is in place for pre-reform GCSEs i.e. an approach based on a mixture of statistics and examiner judgement.**

**Question 2:**

**To what extent do you agree or disagree with our proposed approach to the award of new GCSEs in the second and subsequent years?**

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Please give reasons for your answer:

.....

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.....

**Question 3**

**To what extent do you agree or disagree that we should adopt the same approach to awarding grades 1 to 7 in all new GCSEs as we have confirmed will be adopted for new GCSEs in English language, English literature and mathematics?**

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Please give reasons for your answer:

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**Question 4**

**To what extent do you agree or disagree that we should adopt the ‘tailored approach’ to awarding grade 9 in new GCSEs to be awarded from summer 2018?**

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Please give reasons for your answer:

[See response to question 5](#)

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## Question 5

To what extent do you agree or disagree that we should also adopt the 'tailored approach' for those subjects to be awarded from summer 2017 – i.e. English language, English literature and mathematics?

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Please give reasons for your answer:

### Summary of MEI's position and why it matters

Our particular interest is in mathematics, and so we have focused on the effect of the proposals on mathematics. It seemed reasonable to compare the outcomes for mathematics with English and the sciences. We hope that this focused approach will aid Ofqual in considering whether the proposed formula really does achieve fairness across subjects.

We have read carefully the three papers.

Benton, T. (2016). *A possible formula to determine the percentage of candidates who should receive the new GCSE grade 9 in each subject*. Cambridge Assessment Research Report. Cambridge, UK: Cambridge Assessment

Allen R and Thomson D (March 2016). *Options for setting the grade 9 boundary*. education datalab

Ofqual. *Setting the grade standards of new GCSEs in England – part 2* (April 2016)

We have been grateful for very helpful email communications with the authors of the first two papers. We have done some further analysis of our own which none of these papers considers, some of it with the help of extra data supplied by education datalab.

We have found what appear to be weaknesses in some of the arguments used in the papers, though we say this cautiously because we do not have access to the same underlying data as the authors of these papers. This whole discussion is about students who achieve grade 9; these students are, statistically, outliers, and it is always the case that extreme caution needs to be exercised in coming to conclusions about outliers. We consider the questions we have raised and the other data we have looked at sufficient for us to say that:

- **the changes which the proposed formula introduce are unfair on mathematics compared with English and sciences,**
- **the models on which Ofqual's conclusions are based are probably not a reliable enough basis on which to proceed with confidence.**

The first of these matters for several different reasons. We highlight three which impinge on numbers of students progressing to A levels in mathematics and further mathematics; a decrease in such numbers would go against public policy.

- Post-16 A level providers are very sensitive to GCSE grades in their expectations of students being permitted to start A level Mathematics and especially Further Mathematics. Quite often schools and colleges currently require at least GCSE maths grade B for students proposing to start A level Maths (and some expect an A) and GCSE maths grade A (sometimes an A\*) for admission onto an A level Further Mathematics course. As Further Mathematics is often a fourth subject, and fourth A levels are only funded (retrospectively) for students who achieve grade B or better in all their four A levels, there will be even more pressure to admit only very high-achieving students onto Further Maths courses.
- The data seem to suggest that state-funded schools will struggle against independent schools in obtaining top GCSE grades. This will put real pressure on the provision of Further Maths in state-funded schools after so many years of progress, and the inability to provide the course, because numbers are small, will lead to even fewer taking the subject outside of independent schools. There are many factors putting pressure on Further Maths numbers as A levels are reformed and funding rules change, and this would be yet another one.
- Students choosing A levels are also sensitive to GCSE grades. For reasons explained below, some of the very best students will feel that they have not made as much progress in maths as in other subjects. This means they are likely to be more hesitant to commit to one A level in maths, let alone two.

### **The Cambridge Assessment paper**

The Cambridge Assessment paper, which first proposed what is now called ‘the tailored approach’, acknowledges ‘that setting a new grading standard that will be relatively comparable across different subjects is not an easy task and is likely to be controversial.’

We acknowledge the problems which this paper addresses, and accept that the suggested outcomes for (for example) the sciences are indeed fairer than the previously proposed model, when those subjects are considered in isolation. However we feel that the solution which produces a fairer outcome for the sciences produces an unfair outcome for mathematics.

We note the author’s very reasonable interest in promoting inter-subject comparability, given, for example, the assumed equivalence of subjects in the DfE’s various performance measure calculations (page 5, paragraph 2). However it is acknowledged (in Ofqual’s recent consultation and ongoing work on the issue) that the exam system is not currently attempting to achieve inter-subject comparability. The subsequent work aims to achieve this comparability only for grade 9, and is based on the assumption that it has already been achieved for grade A/7; this does not appear to be a reasonable assumption, as the work he quotes from Coe (2008) demonstrates.

In attempting to solve one problem we believe that a different problem has been exacerbated. Ever since the introduction of KS2 and KS3 tests the assessment system in England has awarded more top levels to maths than English. For example, in the KS2 tests in 2015, 52000 pupils achieved level 6 in Maths, 23000 level 6 in grammar, punctuation and spelling (and none in reading). In 2008, the last year in which KS3 SATs were compulsory for state-funded schools, 50000 pupils achieved level 8 in maths, but the system did not allow pupils to record anything above level 7 in English; this pattern continued as teacher assessments replaced tests. The same thing occurs at GCSE currently: 51500 achieve A\*

maths, 31900 A\* English – see table below. It is, of course, debatable whether this difference is justifiable, but it is real.

Numbers... (based on the datalab table)	... achieving A*	... achieving grade 9 20% rule	... achieving grade 9 tailored model
English	31900	22100	20600
Maths	51500	24500	21600

The proportion of students obtaining GCSE grade 9 for English and maths would be very close using either rule. This gives the problem that progress across KS4 is inevitably lower for maths than for English for the most able students; students will feel that they are making less progress in maths. This happens just at the point where students choose whether to continue with the subject, and so contributes to the problems identified in the opening section. It is also the case that maths teachers who are judged by progress measures will feel very hard done by.

We note that all three papers neglect to consider the differences in subjects across key stages, and only compare subjects at the end of KS4. We believe we have identified an important consideration which shows up an unfairness to mathematics.

### The education datalab paper

Moving on to the paper contributed by education datalab, from which some of the figures are quoted in the Ofqual consultation, we are grateful for some email correspondence with one of the authors, and some extra data to clarify some of their calculations.

Two key points arise from this paper which concern us. One is the inclusion of IGCSE data and the other is the weakness of the data used to model grade 8 outcomes.

The modelling in this paper is based on results from a mixture of regulated and unregulated qualifications (page 1). It is then assumed that grades A\* from GCSE (say) and from unregulated IGCSE are of equivalent standard. There is no reason to suppose this is true. Indeed there is anecdotal evidence that some schools choose IGCSE because their students find it easier to achieve the higher grades, for example <https://www.tes.com/news/school-news/breaking-news/schools-turn-igcse-because-they-are-way-easier> Is it reasonable to use models based on equivalence of regulated and unregulated qualifications, and apply them to regulated qualifications?

This then raises the question of how Ofqual will apply the tailored approach formula. The problem is that this formula is not linear, so asking each exam board to apply it independently will not produce the desired overall outcome. (By contrast, the 20% rule is linear, and so it would be possible for it to be applied independently to each specification.)

- One approach which Ofqual could take would be to require each exam board to apply the rule independently to their own candidature. If exam boards do not have similar profiles of candidates, this results in a different overall outcome from that desired. This is particularly true if IGCSE is included; the boards offering IGCSE do indeed have a different profile from that of those offering GCSE, and our modelling suggests a difference of 3400 in the number of grade 9s awarded compared with what is meant to happen – see Appendix 1. This approach works in favour of those taking IGCSE and, if this becomes known, independent schools will be able to take IGCSE and benefit from the increased chance of grade 9; this will reinforce the difficulties for state-funded schools offering A level Further Maths, as indicated

above. State schools could respond by entering their most able students for both GCSE and IGCSE, one for the performance tables and one for the student to get the best result – a perverse and highly undesirable consequence.

- A different approach would be for Ofqual to calculate the total number of grade 9s to be awarded across the cohort, once exam boards have the data for grade 7 and above, and then assign a proportion of the total number of grade 9s to each exam board. Does Ofqual have a mechanism for acting like this, and what formula would Ofqual use to assign the number of grade 9s to each exam board? We are back where we started. The apparent formula used by different boards would be different from the published formula on which Ofqual is now consulting.

Another feature of the education datalab paper is that its predictions for grade 8 do not appear to be reliable, or at least their reliability cannot be tested. The data are not available to base their work on, so they use a formula: 'The top 30% of pupils awarded grade A are imputed grade 8'. But this is precisely the kind of formula which we are moving away from in awarding grade 9, and is not the arithmetic-based approach likely to be used. This makes it very hard to comment sensibly on grade 8 awards – this must be a matter for concern. Again we must stress that this is very important to students considering taking A level Maths or Further Maths.

### Comparing Sciences with Mathematics

We use data from the education datalab paper to calculate the numbers of students achieving grade A\*-A, A, and 9 under two rules in the sciences and mathematics. We do not have access to individual student data, so we shall count sciences as follows. We shall take as a proxy for the number of students taking sciences the sum of those taking physics and those taking additional science. We shall assume that there is no student counted in both the physics data and the additional science data. We shall ignore the core science data (which may underestimate the number of top grades awarded to sciences).

Numbers	Candidates	A*-A / 7	A*	grade 9 using 20% rule	grade 9 using tailored approach
Maths	584906	125735	51651	25147	22316
Sciences	423734	103898	38071	20780	26000

See Appendix 3 for calculations.

Looking at these data it is not at all clear why the 20% rule is unfair on the sciences compared with mathematics. The tailored approach seems very unfair on mathematics. Maths has a significantly larger overall entry, is awarded more A\* grades, more A grades, but fewer grade 9s.

It is because the cohort of scientists is split between separate sciences and core/additional science that the problem arises for those taking separate sciences; the tailored approach is solving the wrong problem and leading to other inequity.

### The Ofqual consultation document

Now we comment on the Ofqual consultation document. We only wish to comment on the first award of grades 8 and 9.

Our first concern is that this document, for example in para 2.35, ignores the fact that the research Ofqual commissioned from education datalab was based on more qualifications than GCSE, including some unregulated ones, and then seems to be applied to GCSE. The formula appears to be applied to GCSE outcomes, but this is misleading. Based on data

shown us by education datalab, which breaks down their figure into GCSE and non-GCSE qualifications, the proportion of grade 9s for GCSE mathematics is likely to be less than 3.2%, rather than the 3.7% in the Ofqual table 1. This is a significant difference in the number of candidates. Even worse, the actual percentage of grade A-A\*s achieved in GCSE maths by 16-yr old students in June 2014 (same year as datalab used) was 16.1%, rather than the 21.5% modelled by education datalab and used in the Ofqual table. Applying the tailored approach formula to these JCQ data gives a figure of 2.4% grade 9 achieved in GCSE Maths – a long way from the 3.7% promised in the table, a difference of over 6000 students – see Appendix 2. It seems to us that the model proposed is not good enough for Ofqual to be confident of proceeding to award high stakes qualifications with important consequences for student progression to A levels.

This lack of understanding of the reliability of the model is exacerbated by the unknown migration towards or away from IGCSE in English and mathematics in June 2017, given the new rules about the use of such qualifications in performance tables. This could have a significant effect.

We note that the GCSE/IGCSE effect in mathematics seems similar to the separate/combined sciences effect in the sciences. When the cohort is divided up into groups of differing abilities, then the process does not work well. This effect needs careful consideration.

Our second concern is that the awarding procedure now contains a mixture of approaches. First there is the well-understood ‘determine key thresholds using statistics and judgement and then determine other thresholds arithmetically’, which applies to grades 1 to 7; then there is a completely different approach to grade 9, which is not norm-referenced or criterion-referenced or using any approach which is understood or currently practised; then the arithmetic approach applies to grade 8, based on grade 9. What actually is grade 9 measuring? It seems to be based (uniquely) on a desire for inter-subject comparability, but based on a grade A/7 award which does not concern itself with inter-subject comparability. It does seem highly unsatisfactory not to know what a grade means.

## **Conclusion**

It can be seen that we do not have confidence in the proposals in the consultation for the first award of grades 8 and 9. The models are based on some assumptions which do not seem to stand up to scrutiny. The models predict a poor, and comparatively unfair, outcome for mathematics compared with English and the sciences, with the associated consequences for post-16 uptake. Based on the information we have about the models, we do not believe they are reliable enough to base predictions on, and this leaves us with considerable uncertainty about the outcomes; the data we do have suggest that the outcomes for mathematics will be even worse than the models suggest. This really matters for students considering progression in mathematics.

None of this should be seen as being critical of the authors of the various papers. It is in the nature of modelling that data are often inadequate, that assumptions can be hard to justify and outcomes not precise enough for the purpose for which they are required. It may well be that the authors are able to respond to our concerns by referring to other data, justifying their assumptions or validating the outcomes of their model in other ways.

This is a complex matter, and we are concerned that Ofqual may press ahead without a good understanding of the outcomes. The best we can suggest is that we start with the 20% model for maths and English in 2017, with Ofqual required to explain if it is necessary to adjust the outcomes in 2017. With the experience of 2017 behind it, Ofqual could then

consult on proposals for grading other subjects, and maths and English in their second year, in early Autumn 2017.

## Appendix 1 – modelling the two approaches Ofqual could take to using the tailored approach

The first approach is for Ofqual to require the different exam boards, including those offering (the successor to) IGSE, to apply the tailored approach independently of each other. Assume that the GCSE boards have a similar candidature profile, and can be considered as one board. The IGCSE boards are also considered as one board. These figures, supplied by education datalab, are for mathematics.

	number of candidates	proportion achieving at least A/7	proportion achieving A*	proportion of A/7 to be awarded 9, by tailored approach	proportion of candidates to be awarded 9	number of candidates to be awarded 9
GCSE	557501	19.1%	7.0%	16.55%	3.16%	17615
IGCSE	27405	70.4%	45.9%	42.18%	29.68%	8135
					Total	25750

The second approach is to apply the tailored approach to all the candidates at the same time, which gives these figures (same table headings).

all	584906	21.50%	8.83%	17.75%	3.82%	22316
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This is a difference of 3400 candidates, a significant number in this context. The percentage of the candidature achieving grade 9 is 4.4%, rather than the 3.82% (or 3.7% in the datalab report, due to those figures being imputed).

This shows that requiring the exam boards to apply the tailored approach to their own candidature independently is likely to result in a different overall outcome from the desired one. This happens because the tailored approach uses a non-linear formula.

If, in the second approach, it was decided that 22316 would be the number of grade 9s to be awarded, how would these be shared between the boards – there would need to be a formula and we are back where we started. The apparent formula used by different boards would be different from the published formula on which Ofqual is now consulting.

Note how the first approach favours candidates of the IGCSE board; this would have consequences for centre behaviour under the first approach.

## Appendix 2 – explaining the figures which different models give

Table 1 in the Ofqual document appears to apply the tailored approach to GCSE, whereas it is actually applying the approach to both GCSE and IGCSE. The proportion of all candidates achieving grade 9 can be obtained in different ways. Doing this is a way of validating the model, checking whether it is reliable enough to draw conclusions from.

The figure of less than 3.2% for GCSE candidates, rather than the 3.7% in Ofqual's table 1, comes from the GCSE row in the first table in Appendix 1.

Applying the tailored approach to the JCQ 2014 GCSE figures for 16 year olds (figures only available for the UK), and with the same table headings, gives the following.

all	596524	16.10%	5.50%	15.05%	2.42%	14454.07
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These different calculations come up with figures of

- 3.8% (or 3.7% in datalab paper) of the candidature awarded grade 9 for a combined GCSE/IGCSE cohort,
- 3.2% based on the datalab model applied only to GCSE candidates, and
- 2.4% when the tailored approach is applied to the best JCQ data we have for the actual students.

Taking a nominal candidature of 500000, these are 19000, 16000 and 12000 candidates respectively, a difference of over 6000 candidates. This variation in modelling is surely too unreliable to make any helpful predictions. It certainly is the case that the figure in the Ofqual table 1, of 3.7%, must be regarded with real caution.

### Appendix 3 Comparing maths with sciences – the calculations

	number of candidates	proportion achieving at least A/7	proportion achieving A*	proportion of A/7 to be awarded 9, by tailored approach	proportion of candidates to be awarded 9	number of candidates to be awarded 9
Maths	584906	21.50%	8.83%	17.75%	3.82%	22316
additional science	272595	12.00%	2.60%	13.00%	1.56%	4252
physics	151139	47.10%	20.50%	30.55%	14.39%	21748
sciences	423734					26000

The figures for the 20% rule are as follows.

	number of candidates	proportion achieving at least A/7	proportion achieving A*	number of candidates to be awarded 9 by 20% rule
Maths	584906	21.50%	8.83%	25147
additional science	272595	12.00%	2.60%	6542
physics	151139	47.10%	20.50%	14237
sciences	423734			20779

### Question 6:

**To what extent do you agree or disagree that the award of grade 9 in the second and subsequent years should be based on the standard set in the first award?**

Strongly agree

Agree

Neither agree nor disagree

Disagree

Strongly disagree

Please give reasons for your answer:

See response to question 5.

We need to be confident that the approach adopted in the first year was actually fair before committing to subsequent years.

### Question 7

**We have not identified any ways in which our proposals on setting the grade standards of new GCSEs would impact (positively or negatively) on persons who share a protected characteristic.<sup>1</sup> Are there any potential impacts we have not identified?**

Yes       No

**If yes, please provide them here:**

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### Question 8

**Are there any additional steps we could take to mitigate any negative impact resulting from these proposals on persons who share a protected characteristic?**

Yes       No

**If yes, please comment on the additional steps we could take to mitigate negative impacts:**

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<sup>1</sup> 'Protected characteristic' is defined in the Equality Act 2010. Here, it means disability, racial group, age, religion or belief, pregnancy or maternity, sex, sexual orientation and gender reassignment.

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**Question 9**

**Have you any other comments on the impacts of the proposals on students who share a protected characteristic?**

Yes       No

**If yes, please provide them here:**

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## Accessibility of our consultations

We want our consultations to be read and understood by as many people as possible. We would appreciate it if you could spare a few moments to answer the following questions.

**We want to write clearly, directly and put the reader first. Overall, do you think we have got this right in this consultation?**

Yes                       No

**Do you have any comments or suggestions about the style of writing?**

Yes               No

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**How many of our consultations have you read in the last 12 months?**

1

2

3

4

5

More than 5