

Analysis of Responses to our Consultation on Regulating Use of Calculators in New GCSEs, AS and A Levels



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Executive Summary

Our consultation about regulating the use of calculators in new GCSEs, AS and A levels took place between 2nd December 2015 and 11th January 2016. The consultation questions were available to either complete online or to download. A copy of the consultation is available at www.gov.uk/government/consultations/regulating-use-of-calculators-in-new-gcses-as-and-a-levels.

There were 43 responses to the consultation – 26 from individuals, and 17 from organisations.

The majority of respondents supported our proposed approach, noting that it rightly places the onus on exam boards to ensure their qualifications are valid.

However, some respondents raised concerns about our proposals, in particular:

- a perceived lack of transparency compared to current arrangements, and a perceived reduction in the scope for public and subject expert scrutiny of exam boards' approaches;
- the particular risk that calculators could compromise the validity of exams in subjects such as mathematics and statistics; and
- the scope for certain calculator functions – such as communication with the internet and computer algebra systems – to undermine the integrity of exams.

1. Introduction

The consultation on regulating use of calculators in new GCSEs, AS and A levels

This report is a summary of the views expressed by those who responded to our consultation on regulating the use of calculators in new GCSEs, AS and A levels, which took place between 2nd December 2015 and 11th January 2016.

Background

New GCSE, AS and A level qualifications are being introduced in England. We have consulted on and announced our policy on the general design of these new qualifications. We have also set out our policy and technical arrangements for the subjects where first courses began in September 2015,¹ and for the subjects which will be introduced for first teaching from September 2016.²

This consultation focused on the approach we should take to regulating the use of calculators in these new qualifications.

¹ New GCSEs in English language, English literature and mathematics, as well as new AS and A levels in art and design, biology, business, chemistry, computer science, economics, English language, English language and literature, English Literature, history, physics, psychology and sociology.

² New GCSEs in art and design, biology, chemistry, citizenship studies, classical Greek, combined science, computer science, dance, drama, food preparation and nutrition, French, geography, German, history, Latin, music, physical education, physics, religious studies and Spanish. New AS and A levels in classical Greek, dance, drama and theatre, French, geography, German, Latin, music, physical education, religious studies and Spanish.

2. Who responded?

We received a total of 43 responses to our consultation – 26 from individuals, and 17 from organisations. 42 responses were from individuals or organisations based in England or Wales, the other response was from an individual based elsewhere in the EU.

Table 1: Breakdown of consultation responses

Personal / organisation response	Respondent type	Number
Personal	Teacher	21
Personal	Educational specialist	3
Personal	Student	1
Personal	Not specified	1
Organisation	School or college	6
Organisation	Subject association or learned society	4
Organisation	Awarding organisation	3
Organisation	Private training provider	1
Organisation	Other organisation	3

3. Approach to analysis

We published the consultation on our website. Respondents could choose to respond using an online form, by email or by posting their answers to the consultation questions to us.

This was a consultation on the views of those who wished to participate and while we made every effort to ensure that as many respondents as possible had the opportunity to reply, responses cannot be considered to have been made by a representative sample of the general public or any specific group.

Data presentation

We present the responses to the consultation questions in the order in which they were asked.

The consultation asked 7 questions and each had a different focus. Respondents could choose to answer all or just some of the questions.

For some of the questions, respondents could indicate the extent to which they agreed with our proposals, using a 5-point scale (Strongly agree, Agree, Neither agree nor disagree, Disagree and Strongly disagree), as well as providing comments on our proposals.

For these questions, we set out respondents' views using the 5-point scale. Where respondents provided further comments, we present these separately.

During the analysis phase we reviewed every response to each question.

4. Views expressed – consultation response outcomes

In this section we report the views, in broad terms, of those who responded to the consultation document. We have structured this around the questions covered in the consultation document.

A consultation is not the same as a survey and the responses only reflect the views of those who chose to respond. Typically these will be those with strong views and/or particular experience or interest in a topic. What follows is a fair reflection of the views expressed by respondents to the consultation.

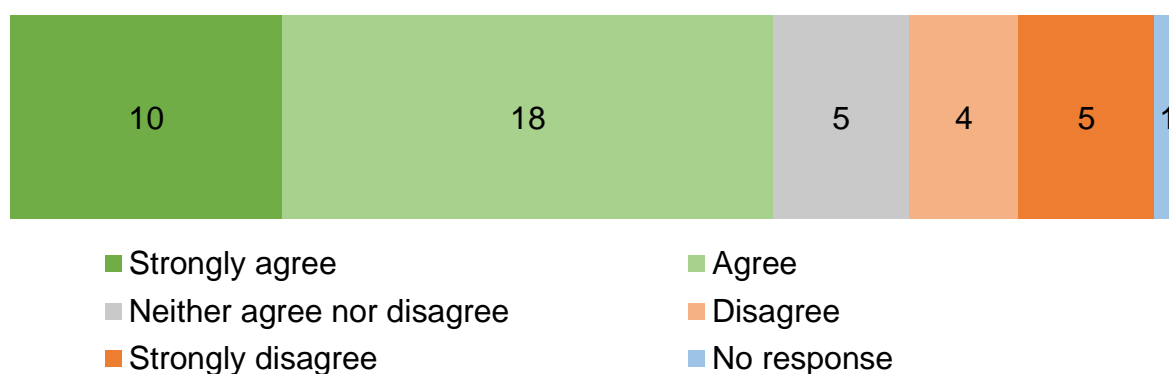
A list of the organisations that responded to the consultation is included in Appendix A.

Our approach to regulating use of calculators in new GCSEs, AS and A levels

Question 1: To what extent do you agree or disagree with our proposed approach to regulating the use of calculators in new AS and A level qualifications?

As illustrated in figure 1, the majority of respondents (28 in total) either agreed or strongly agreed with our proposed approach.

Figure 1 - overview of responses to Question 1



Of those who agreed or strongly agreed with our proposals:

- Six (four organisations, two individuals) commented that exam boards were best placed to determine how calculators should be used in exams, and that the onus should be on exam boards to ensure that their exams reflect their approach to the use of calculators.

- Five (three individuals, two organisations) commented that the new AS and A levels in mathematics place particular emphasis on the use of technology.

The DfE subject content documents for AS/A level Mathematics and Further Mathematics make it clear that the use of technology, including calculators, must permeate the study of the subject. The student's ability to use a calculator becomes one of their mathematical skills, and should be assessed in the examination.

These respondents felt that our proposed approach could support the curriculum intentions around use of technology.

- Three organisations commented that there was a need for exam boards to work together to ensure a common approach is taken across exam boards, and commented that our proposals would not prevent this. One further individual noted that – if exam boards did choose different approaches – this could make schools' choice of specifications more complex.
- Two individuals noted that calculator technology (and its routine uses) changes over time, and that exams should change to reflect this. One further individual noted that calculators are a part of everyday life, and overly restricting their use creates an artificial assessment.
- One individual noted that it was not clear how effectively, or how consistently, current restrictions on calculator use were policed.

Of those who disagreed or strongly disagreed with our proposals:

- Four organisations commented that a different approach was needed for use of calculators in mathematics and statistics, where a greater proportion of the exams could be compromised by inappropriate use of calculators.
- Three organisations expressed concerns that – compared to the current arrangements – the public and independent experts would have less scope to review and scrutinise exam boards' approaches to the use of calculators.³

³ These respondents appear to have misunderstood the current arrangements. The main exam boards have – through the Joint Council for Qualifications – adopted a common approach to the use of calculators in GCSEs, AS and A levels. However, this is **not** mandated by Ofqual; it is a self-regulatory approach that has not been independently scrutinised. The only qualification where we have set rules governing the use of calculators is for the new GCSEs (graded 9 to 1) in mathematics.

- Two organisations expressed concerns that different exam boards could take very different approaches to the use of calculators, which could impact on the comparability of qualifications.
- One organisation commented that the current (self-regulatory) approach works well, and that there was no need for additional regulation in this area.
- One organisation proposed setting up an independent working group to address the use of calculators in mathematics and statistics exams.
- One individual commented that unrestricted use of calculators – particularly those with sophisticated functions for solving algebraic equations and/or performing calculus – would seriously undermine the validity of mathematical subjects.
- One individual commented that there should be no restrictions on calculator use in exams.

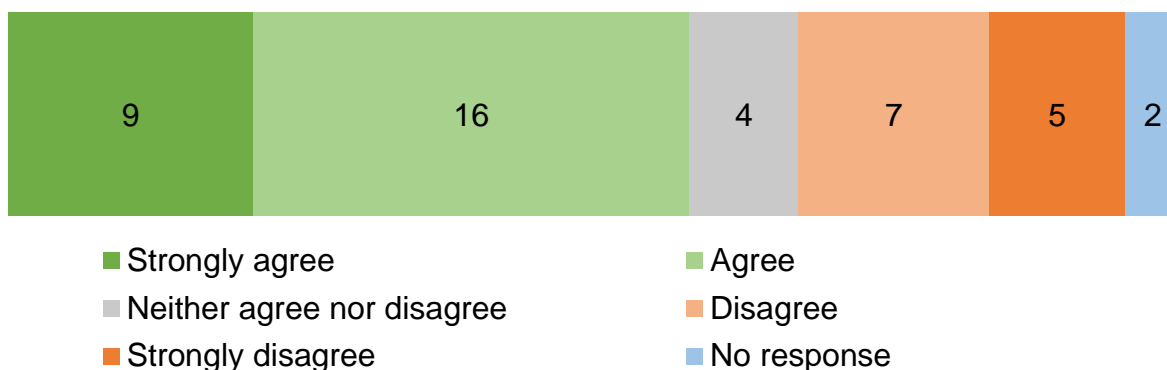
Of those who neither agreed nor disagreed with our proposals:

- One individual commented that it was difficult to respond without knowing what restrictions exam boards would ultimately put in place.
- One organisation commented that our proposed rules were vague.
- One organisation commented that our proposals did not appear to address our concern that exams testing mathematical skills could be reduced to an exercise in calculator use.

Question 2: To what extent do you agree or disagree with our proposed changes to our approach to regulating the use of calculators in exams for new GCSEs?

As illustrated in figure 2, the majority of respondents (25 in total) either agreed or strongly agreed with our proposed approach.

Figure 2 - overview of responses to Question 2



Many of the comments in response to this question were similar to, or directly referenced, responses to question 1 above.

Of the respondents who agreed or strongly agreed with our proposals:

- Five individuals commented that our proposals would facilitate the use of technology in exams. One further individual commented that calculators were a part of everyday life which should be reflected in exams
- Three (one individual, two organisations) commented that there was a need to ensure all exam boards took a consistent approach. One further individual noted that a consistent approach across GCSE, AS and A level was desirable.
- Three organisations commented that it was appropriate to place the onus on exam boards to demonstrate that they had fully considered the potential issues arising from the use of calculators.
- Two individuals commented that exam approaches needed to keep pace with changes in technology.

Of those who disagreed or strongly disagreed with our proposals:

- Four (three organisations and one individual) commented that a different approach was needed in mathematics, where certain calculator functions could have a significant impact on the validity of qualifications.
- Three organisations again expressed concerns about the lack of independent and public scrutiny of exam boards' approaches.
- Two (one individual, one organisation) commented that regulation was needed to ensure exam boards take a consistent approach.
- One individual commented that there was a need to distinguish between the different types of graphical calculators available.

- One individual expressed concerns about not being able to use a calculator in exams.
- One organisation commented that the current (self-regulatory) approach works well, and that there was no need for additional regulation in this area. This organisation supported the removal of the specific requirements for new mathematics GCSEs, but did not support the introduction of qualification-level rules.

Of those who neither agreed nor disagreed with our proposals:

- One organisation commented that – in practice – there was likely to be little change from the current arrangements.
- One organisation commented that care was needed to ensure different calculators do not advantage or disadvantage different students.

Changes to our Conditions and requirements

Question 3: Do you have any comments on our proposed new Conditions for all new GCSE, AS and A level qualifications?

17 respondents (10 organisations, 7 individuals) provided comments in response to this question:

- Four organisations commented that – given their opposition to our proposed approach, they did not support the introduction of these Conditions.
- Three (two organisations, 1 individual) queried whether our proposed Condition covered other electronic devices (smartphones, computers) or mechanical calculators (slide rules, abacuses). One further individual noted that our proposed Condition did appear to cover smartphones and computers.
- Two (one individual, one organisation) commented that the phrase “despite such use” implied that the use of calculators would necessarily always compromise validity of exams – and felt this was not the case.
- Two organisations proposed additional specific restrictions on calculator functions – one suggested calculators must be prevented from communicating with others’ devices or the internet during the exam, and one suggested specific restrictions on algebra and calculus functions.
- One individual commented that different rules would be needed for different subjects, and one further individual highlighted mathematics and statistics as particular examples.

- One individual commented that – even in mathematics – exam questions can be written in a way which reflects (and expects) use of more sophisticated calculators. This respondent felt this was a more realistic test of students’ abilities in a real-world scenario.
- One individual commented that all calculators should be allowed in all exams.
- One individual noted that our proposed Conditions did not link to the subject content requirements for use of technology in subjects such as AS and A level mathematics – and suggested exam boards should be required to explain how their approach to use of calculators aligns with these requirements.⁴

Two individuals also commented on issues outside the scope of the consultation – we cover these under ‘Other issues’ below.

Question 4: Do you have any comments on our proposed changes to our existing Conditions and requirements for new GCSEs in mathematics?

Fourteen respondents (10 organisations, 4 individuals) provided comments in response to this question. Of these, four organisations and two individuals simply cross-referred to their earlier answers. Those who made further comments expressing the following views:

- Two organisations commented that the proposed changes were not needed – with one noting that new GCSE specifications had already been accredited against the existing rules. One further organisation supported removing the detailed rules for new mathematics GCSEs, but felt additional regulation was unnecessary.
- One individual commented that rules should clearly state which types of calculators are (and are not) permitted. One organisation also noted that students should not be expected to use more than a basic scientific calculator at GCSE.
- One organisation commented that prohibitions of specific functions (algebra functions, locally stored data and communications with others or the internet) were needed.
- One individual expressed concerns about potentially inequality between different year groups if the rules change.

⁴ We did not include this requirement in the new Conditions proposed here because we have included it in the subject-specific rules for AS/A level mathematics and AS/A level further mathematics.

One organisation also commented on issues outside the scope of the consultation – we cover these under ‘Other issues’ below.

Equality Impact Assessment

Question 5: We have not identified any ways in which the proposals for regulating use of calculators in exams would impact (positively or negatively) on persons who share a protected characteristic.⁵ Are there any potential impacts we have not identified?

Seven respondents (six individuals and one organisation) provided comments in response to this question, expressing the following views:

- Three respondents (all individuals) commented that students from poorer backgrounds⁶ might be disadvantaged if they could not afford more expensive calculators that other students could use. One of these respondents went on to suggest that students from certain ethnic minorities are more likely to be from poorer backgrounds.
- Two respondents (one organisation, one individual) commented that visually impaired students can find it challenging to use a calculator, even when using adapted models. They did not comment on whether our proposals would change this situation.
- Similarly, one individual commented that accessible calculators often have more limited functionality, which could place disabled students at a disadvantage compared to a non-disabled student using a more sophisticated calculator.
- One organisation commented that disabled students should be eligible for support in an exam, such as an assistant to operate a calculator for them.

Question 6: Are there any additional steps we could take to mitigate any negative impact resulting from these proposals on persons who share a protected characteristic?

Six respondents (all individuals) provided comments in response to this question, expressing the following views:

⁵ ‘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.

⁶ Level of income is not a Protected Characteristic within the meaning of the Equality Act 2010, so any inequity associated with level of income is not strictly an equality impact. However, we have considered the broader fairness issues associated with these concerns, and think this is the most appropriate place to report these responses.

- One respondent commented that we should allow disabled students extra time to take exams, and students access to calculators in all exams.
- One respondent commented that we should allow all calculators except those which can perform algebraic manipulation.
- In relation to concerns about the cost to students, one respondent commented that we should beware of financial inequality, one commented that students should not be required to use different calculators at GCSE and A level, and one suggested a voucher scheme targeted at students with certain protected characteristics.
- One respondent suggested allowing students with disabilities to use software on a tablet computer instead of a calculator.
- One respondent explained that they did not know enough about current exam rules to comment.

Question 7: Do you have any other comments on the impacts of the proposals on students who share a protected characteristic?

No respondents provided comments in response to this question.

Other issues

Some respondents raised issues that were outside the scope of the consultation. In particular:

- one individual commented that changes to teaching at Key Stage 1 and Key Stage 2 were needed,
- one individual commented that we should not change the grading scale for new GCSEs, and
- one organisation commented favourably on the proportion of mathematics GCSE questions which must be answered without the use of a calculator.

Appendix A: List of organisational consultation respondents

When completing the questionnaire, respondents were asked to indicate whether they were responding as an individual or on behalf of an organisation.

Below we list those organisations that submitted a response to the consultation. We have not included a list of those responding as an individual; however all responses were given equal status in the analysis.

A Level Mathematics Advisory Board (ALMAB)

AQA

Association of Teachers of Mathematics

Hills Road Sixth Form College

Institute of Mathematics and its Applications

Mathematical Association

Mathematics in Education and Industry

OCR

Pearson

Royal Grammar School, Guildford

Royal Masonic School for Girls

Royal Statistical Society

Science Studio Limited

Sherborne Girls' School

St Helen and St Katharine School

STEM Learning

Yateley School

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