

Preparing for changes in post-16 Mathematics Education.

NANAMIC Annual Conference 2017

What next?

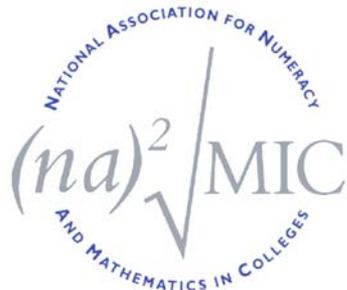
Responding to post-16 developments (GCSE, Functional Skills, Core Maths, A level, Adrian Smith report)

Date

Thurs 13th July 2017

Mick Blaylock

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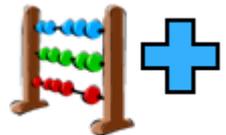


The Post-16 Landscape: Aims of the session



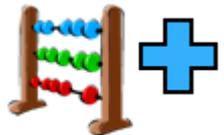
Consider:

- Current developments in mathematics education that impact on provision for post-16 students.
- How should providers responding to these developments?
- How are providers responding to these developments?
- What support is needed for post-16 providers?



The Post-16 Landscape

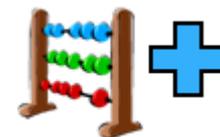
- Changes in and progression from GCSE
- Functional Skills reform
- New linear A levels with prescribed content and the use of technology 'permeating' throughout
- Core Maths – rationale, logistics, and lessons learnt from Early Adopters and the first set of examinations results.
- Adrian Smith report. Recommendations/ proposals, government response and implications



Recent changes to mathematics education

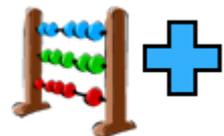
- **Strengthened national curriculum benchmarked against high-performing jurisdictions** including Singapore and Massachusetts.
- ~~Year 7 catch-up check~~ for mathematics and English.
- A new maths GCSE which **ensures essential skills in numeracy and stretches the most able.**
- A “condition of funding” for **16 to 18-year-olds without at least grade C** at GCSE to **continue studying maths** (and English).
- Universities’ formal role in **design of A levels.** A level maths and further maths undergoing **significant redesign** as a result – first teaching September 2017.
- New **level three ‘Core Maths’ qualifications** to encourage more **16-18 year olds with a good GCSE at age 16** to continue the subject.

Source Vanessa Pittard, DfE at Early Adopters National Conference April 2016



Timeline

	GCSE	Core Maths	A level
Sept 2014 – Aug 2015	GCSE Maths and English resits as a condition of funding	First teaching in Early Adopters + others Funding for Early Developers to teach from Sept 2015	
Sept 2015 – Aug 2016	First teaching of new GCSE	c.3000 entered for first Core Maths examinations	
Sept 2016-Aug 2017	First examinations of new GCSE with revised 9-1 grading	c.6000 entered for 2017 Core Maths examinations	
Sept 2017- Aug 2018			First teaching of new mathematics A level



GCSE CHANGES

Changes in and progression from GCSE

For first examination in 2017

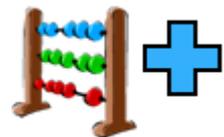
- Grades
 - Numbered
 - grade 4 a “**standard pass**”
 - grade 5 a “**strong pass**”
- Content
 - Increased to include surd form for trig, geometric proof
 - Formulae to learn
- Examination
 - 1 non calculator paper out of 2 or 3 papers
 - Problem solving

NEW GCSE GRADING STRUCTURE	CURRENT GCSE GRADING STRUCTURE
9	A*
8	
7	A
6	B
5	
4	C
3	D
2	E
1	F
	G
U	U

Annotations in the table:

- GOOD PASS (DfE)**: 5 and above = top of C and above
- AWARDING**: 4 and above = bottom of C and above

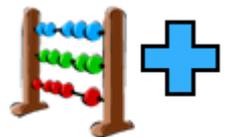
What will be the impact of these changes on student performance, progression to A level, teaching at A level?



GCSE content

Subject content introduced in the new GCSE:

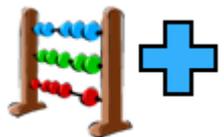
- Know the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° ; know the exact value of $\tan\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60° (Foundation and Higher tiers).
- Use inequality notation to specify simple error intervals due to truncation or rounding (Foundation and Higher tiers).
- Use Venn diagrams (Foundation and Higher tiers).
- Work with percentages greater than 100% (Foundation and Higher tiers).
- Recognise and use the equation of a circle with centre at the origin; find the equation of a tangent to a circle at a given point (Higher tier only).
- Find approximate solutions to equations numerically using iteration (Higher tier only).
- Interpret the gradient at a point on a curve as the instantaneous rate of change; apply the concepts of average and instantaneous rate of change (gradients of chords and tangents) in numerical, algebraic and graphical contexts (Higher tier only).



GCSE content

Foundation tier now includes previously Higher tier content:

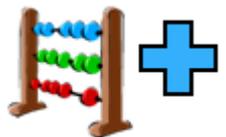
- Using trigonometric ratios
- Calculating with and interpreting standard form ($A \times 10^n$), where $1 \leq A < 10$ and n is an integer
- Applying addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors
- Factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares
- Using $y = mx + c$ to work with straight lines on graphs.



GCSE examinations

Content - latitude of +/- 3%

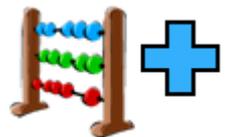
Content	Foundation Tier % (1-5)	Higher Tier % (4-9)
Number	25	15
Algebra	20	30
Ratio, proportion and rates of change	25	20
Geometry and measures	15	20
Probability and statistics	15	15



GCSE examinations: Assessment Objectives

Weighting

	Assessment Objective	Foundation Tier % (1-5)	Higher Tier % (4-9)
AO1	Use and apply standard techniques	50%	40%
AO2	Reason, interpret and communicate mathematically	25%	30%
AO3	Solve problems within mathematics and other contexts	25%	30%

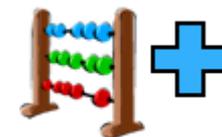


Comparison of different GCSE examinations

- All boards have one non-calculator paper

Exam Board	Number of papers	Length	Marks per paper
AQA	3	1 hr 30 mins	80
OCR	3	1 hr 30 mins	100
Pearson Edexcel	3	1 hr 30 mins	80
WJEC Eduqas	2	2 hrs 15 mins	120

Questions in assessments will be less clearly structured and more open-ended, frequently set within real-world contexts.



GCSE mathematics: 2017 entries

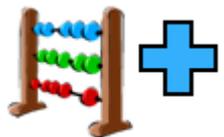
- The provisional data shows that this year 53% of students are entered for higher tier. We don't have this data (or similar) collected at the same time last year, but other data suggests that in recent years a larger proportion of students was entered for higher tier.

Post-16 entries in GCSE English and maths

- These are the final re-sit opportunities on the outgoing (A* to G) qualifications. Entries have increased by 23% in English and 6% in maths.

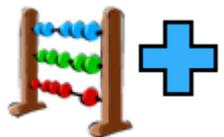
Source: Ofqual blog 15 June 2017

<https://ofqual.blog.gov.uk/2017/06/15/2017-entry-data-things-to-look-out-for/>



Changes in and progression from GCSE

- Grade 3 → GCSE resit
- Grade 2- → Level 2 mathematics (e.g. Functional Skills)
- Grade 4+: the options
 1. Drop the subject
 2. Core Maths
 3. A and AS level Mathematics and Further Mathematics— entrance requirements?

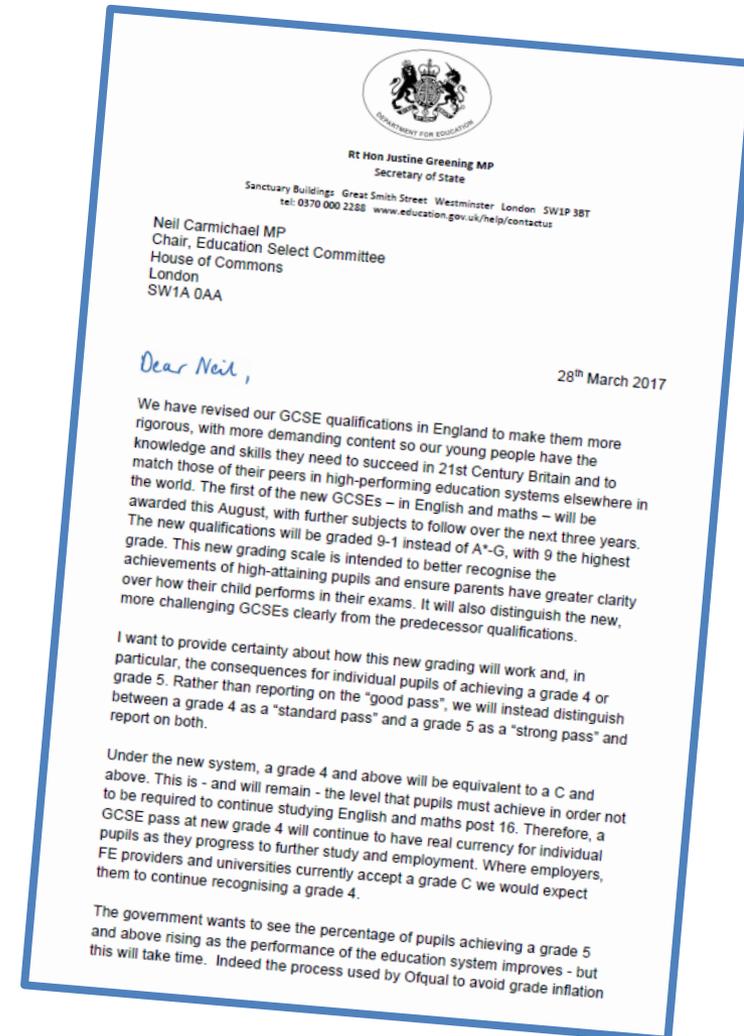


Standard Pass announcement

28th March 2017

‘Rather than reporting on the “good pass”, we will instead distinguish between a grade 4 as a “**standard pass**” and a grade 5 as a “**strong pass**” and report on both.’

‘.. a grade 4 ... will remain the level that pupils must achieve in order not to be required to continue studying English and maths post 16.’



GCSE resits – conditions of funding

Annex D: Condition of funding on provision of English and mathematics in 2017 to 2018

- The teaching of English and maths qualifications is a condition of funding for students undertaking study programmes who do not hold either a grade 9 to 4 or A*-C in these subjects and are studying for 150 hours or more in the academic year.
- Full time students (those on a study programme of at least 540 planned hours if age 16 to 17 or at least 450 hours if age 18) starting their study programme who have a grade 3 or D GCSE or equivalent qualification in maths and/or English must be enrolled on a GCSE, rather than an approved stepping stone qualification.

 Education & Skills
Funding Agency

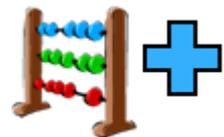
Funding guidance for young people 2017 to 2018

Funding regulations

Version 1.0 published April 2017

Source: Funding guidance for young people 2017 to 2018 (Funding regulations, Version 1.0 published April 2017)

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/607246/16_to_19_funding_guidance_2017_to_2018_v_1.0_003.pdf



16 year olds - GCSE English language (including IGCSE®)¹
2017 (estimated) 2016 (actual)

Grade	2017 (estimated)	2016 (actual)
9	2%	A* 4%
8	7%	
7	16%	A 16%
6	31%	
5	50%	B 40%
4	70%	C 70%
3	93%	D 89%
2	98%	E 96%
1	99%	F 98%
U	100%	G 99%
		U 100%

16 year olds - GCSE maths
2017 (estimated) 2016 (actual)

Grade	2017 (estimated)	2016 (actual)
9	3%	A* 7%
8	11%	
7	20%	A 20%
6	33%	
5	53%	B 41%
4	71%	C 71%
3	88%	D 86%
2	93%	E 91%
1	97%	F 94%
U	100%	G 97%
		U 100%

HEALTH WARNINGS

1. These are estimates based on results from 2016; actual results in 2017 may be different (see the technical explanation)
2. These are national estimates; individual school and exam board results will be different from the national results.

See also:
bit.ly/2oa6Bf8
bit.ly/2mYCCT3

(Note: all percentages are cumulative)

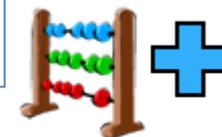
¹ IGCSE® is the registered trademark of Cambridge International Examinations

Figure 2: Estimated proportions of students at each grade in 2017

Ofqual blog: Estimated proportions at each GCSE grade

- Modelling is based on 2016 data using the marks that students got in 2016.
- These are best estimates for England but individual exam boards' results will be more varied and individual schools could see very different proportions.
- We can be more confident in our estimates at grades 7, 4 and 1 because the bottom of these grades will be set to align with the bottom of grades A, C and G in the previous A* to G grade structure. Other boundaries will be calculated arithmetically and so the proportions could vary a bit more.

Source: Ofqual blog 5 April 2017
<https://ofqual.blog.gov.uk/2017/04/05/setting-grade-9-in-new-gcses/#comment-1002>

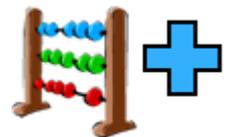


4	71%	C	71%
3	88%	D	86%
2	93%	E	91%
1	97%	F	94%
U	100%	G	97%
		U	100%

Ofqual: Estimated proportions at GCSE grades U to 4

In 2016 15% of the entry achieved grade D. The Ofqual estimate for 2017 is that 17% of the entry will achieve a grade D.

This represents an increase of almost 15% equivalent to **23,150** candidates.



GCSE: support from exam boards



Home / Subjects / Maths / GCSE / Mathematics (8300)

GCSE Mathematics

Teaching from: September 2015



Our

QUALIFICATIONS

Home > Our qualifications > GCSEs > Mathematics (9-1)

Edexcel GCSE Mathematics (9-1) from 2015



MATHEMATICS

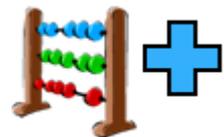
Home > Qualifications > Mathematics > GCSE

GCSE (9-1) Mathematics



Home Qualifications Subjects Administration OCR for

GCSE
Mathematics (9-1) - J560 (from 2015)

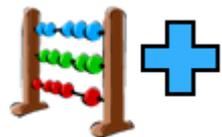
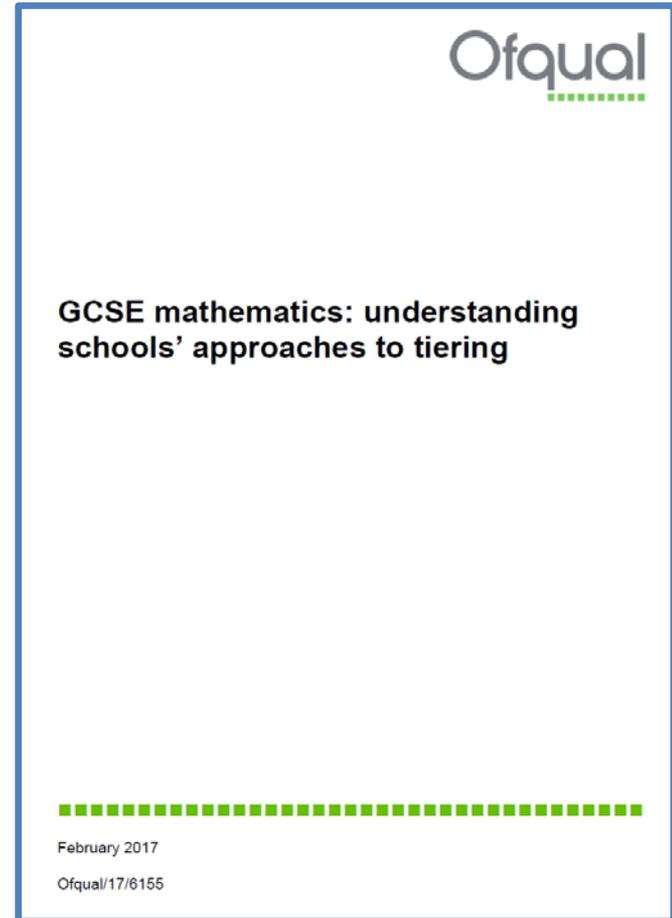


GCSE: School responses

... schools are carefully considering their tier entry choices ahead of the summer 2017 series.

The majority of surveyed schools were intending to enter a greater proportion of their students into the foundation tier in summer 2017 than they had in previous exam series.

This was primarily due to both the higher and foundation tiers being more challenging in the reformed qualifications.



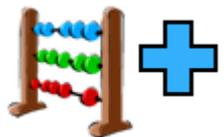
GCSE: School responses

GCSEs 'less appealing'

Early indications suggest that the new English and maths GCSEs are less appealing and enjoyable than the old ones. In recent post-16 evenings several Year 11 students said that they would not choose A levels in maths or English because they did not enjoy these subjects.

NOT GOOD NEWS at a time when there is such a premium on these two disciplines.

Bill Watkins, Chief Executive of SFCA, TES 17/3/2017

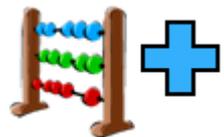


FUNCTIONAL SKILLS

Functional Skills reform

- From 2014, it has been a funding condition that college-based 16-19 year olds who have not already achieved A*-C GCSEs in maths and English have been required to continue studying towards achieving them.
- After GCSE, Functional Skills qualifications are the most prevalent maths and English qualification available at level 2 and below.
- Over 800,000 certificates were awarded in 2013/14

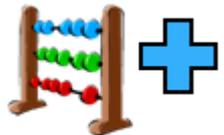
Source: Report of the Independent Panel on Technical Education - April 2016



Functional Skills reform

- Following a review undertaken by the Education and Training Foundation last year, the Government is reforming maths and English Functional Skills qualifications to improve their
 - relevance and content, as well as their
 - recognition and credibility in the labour market.

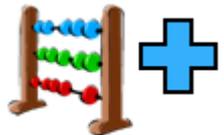
Source: Report of the Independent Panel on Technical Education - April 2016



Functional Skills reform

- We also note that last year Ofqual intervened to require awarding organisations to improve assessment materials and strengthen standard-setting materials.
- This should make Functional Skills at level 2 a more reliable indication of secure literacy and numeracy.
- Government should consider how the funding condition should operate in light of these improved qualifications.

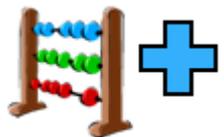
Source: Report of the Independent Panel on Technical Education - April 2016



Updates from the ETF (1/2)

02/11/2016: The final drafts of the Subject Content and Standards on both subjects were submitted to the Foundation to meet their deadline. We are now finalising our report on the process. The Foundation produced a short report with recommendations which was submitted to the minister. We will provide another update regarding when and where our report will be published – probably on our website – in due course. For information, we have been separately commissioned by the Foundation, following a tendering process, to develop exemplar curricula aimed at teachers on Functional Skills and we are starting that work shortly with recruited writers.

17/01/2017: The first drafts of the Functional Skills Exemplar Curricula have been submitted to the Foundation. We are now working with reviewers to check and refine the draft activities developed by our subject expert writers. Drafts of the materials will be available on a secure area of the portal, supported by four consultation events. If you would like to contribute to the review process, please visit our [Contact Us](#) page



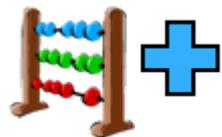
Updates from the ETF (2/2)

30/01/2017: The draft Exemplar Curricula were made available for review in the secure area of the FS Reform portal on Friday 27/01. Reviewers have until Friday 24th February to feed back. If you wish to register to review the material, please visit our [Contact Us](#) page. Please note this is an unpaid activity.

24/02/2017: The Exemplar Curricula review period has now closed. Thank you to everyone who contributed to this process – your time and valuable contributions are much appreciated. We are now reviewing the feedback and we will be working with our writers over the coming weeks in order to finalise the materials. We will continue to keep portal registrants updated of progress.

23/03/2017: The latest news on the Reform Programme is available from the Education and Training Foundation [here](#). Please note that the consultation website referenced in the article is this website.

... for implementation from 2019. Further consultations (DfE & Ofqual) later this year.

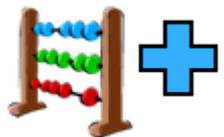


Functional Skills v GCSE resits

- “Functional skills, designed to develop core maths and English skills but with the learning contextualised and relevant, is proven to engage and motivate these learners, particularly those who have been turned off these subjects by their school experience.
- “Maths and English are the most vital skills for economic and social mobility but these results show that repeating the same exercise doesn’t work and a more learner and employer focused approach with functional skills should now be embedded post 16.”
- Mark Dawe, chief executive of the Association of Employment and Learning Providers

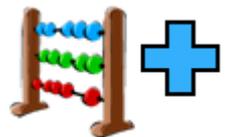
Source: FE week article Aug 25, 2016

<http://feweek.co.uk/2016/08/25/call-for-gcse-resit-policy-change-after-body-blow-results/>



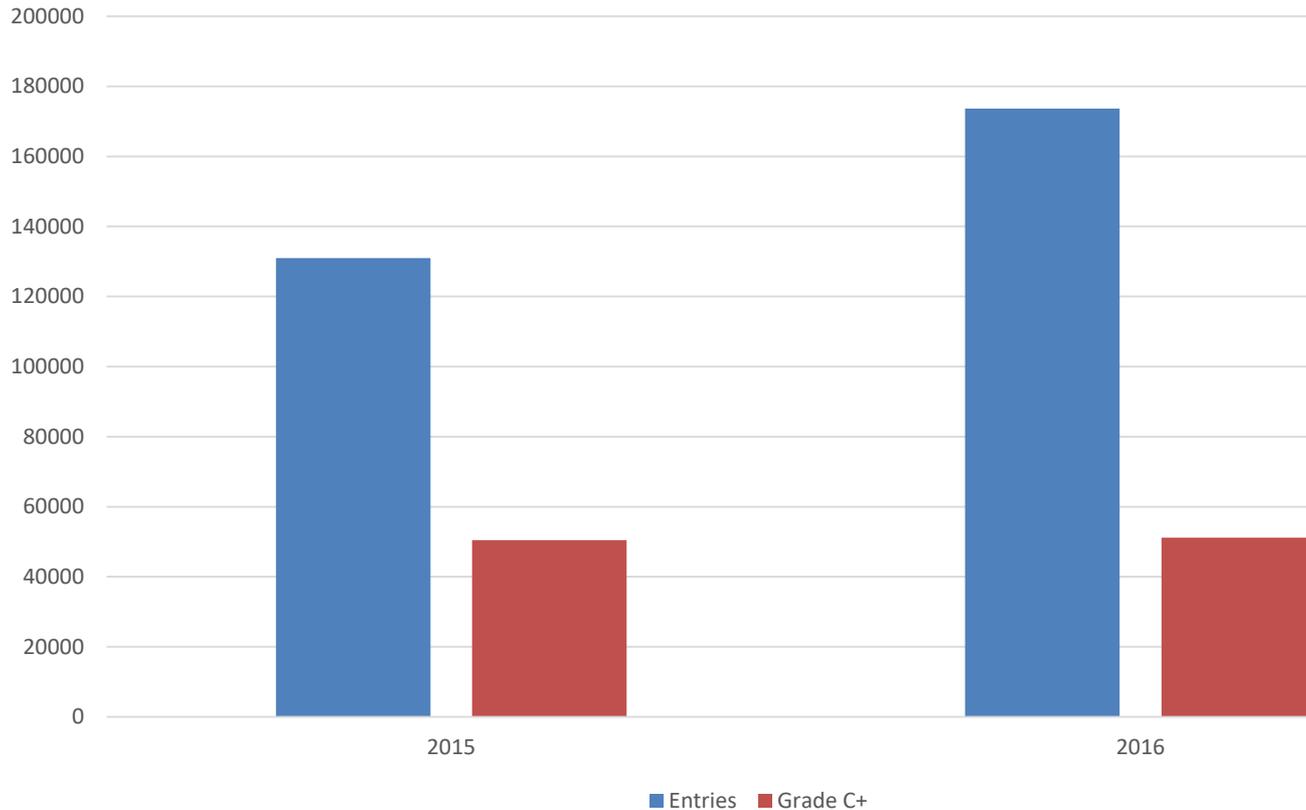
GCSE Mathematics entries for 17+ learners

	2015	2016
Entries	130 979	173 628
Grade C+	50 427	51 220
%ge	38.5%	29.5%



Functional Skills v GCSE resits

GCSE mathematics results for 17+ learners



2015

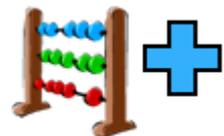
35.8%
achieved
grade C+

2016

29.5 %
achieved
grade C+

2017

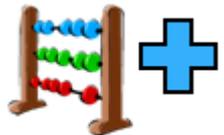
projection
26%???



NEW LINEAR A LEVELS

New linear A levels

- Moving away from modular to linear with terminal assessment
 - new experience for many
- prescribed content
 - Pure, Stats and Mechanics
- use of technology ‘permeating’ throughout
 - including large data sets
- changes in AS level, ‘uncoupled’, and associated changing patterns of provision
- quantitative skills required in other subjects

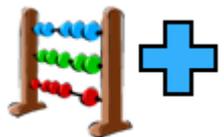


A level: response of sixth form providers to decoupling and funding issues

Meanwhile, the decoupling of AS and A level, combined with low funding levels, means that sixth-form providers are starting to offer fewer subjects (three, rather than four) from the outset.

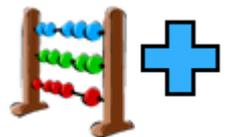
“In a time of great change, it is only in the implementation phase that unintended consequences start to emerge. We need to remain fleet-footed and flexible in order to ensure the effective implementation of the changes for all.”

Bill Watkins, Chief Executive of SFCA, TES 17/3/2017



A and AS level Mathematics (2019)

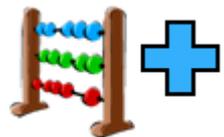
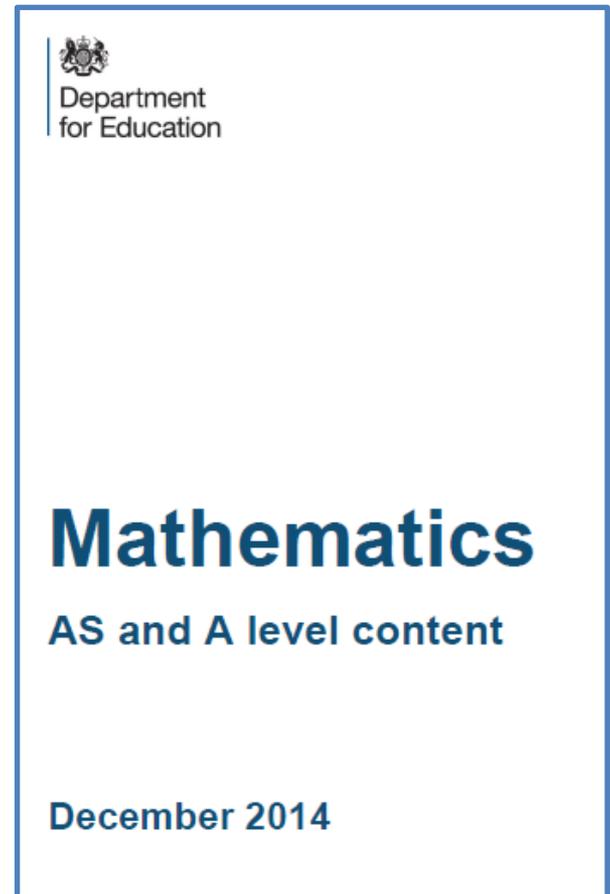
- **New linear structure:** AS will be decoupled from A level, and all assessment will take place at the end of the course.
- **New emphasis:** There will be more emphasis on problem solving, reasoning and modelling, and a requirement for the use of technology to permeate teaching and learning.
- **New content:** The content of AS and A level Mathematics will be fixed. It will include pure mathematics, mechanics and statistics. There will be some choice in content for AS and A level Further Mathematics.



A and AS level Mathematics (2019)

Overarching themes

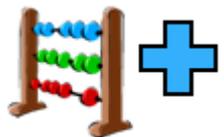
- OT1 Mathematical argument, language and proof
- OT2 Mathematical problem solving
- OT3 Mathematical modelling



Use of technology

8. The use of technology, in particular mathematical and statistical graphing tools and spreadsheets, *must permeate the study of AS and A level mathematics*. Calculators used must include the following features:

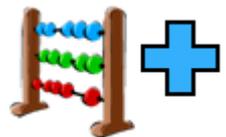
- an iterative function
- the ability to compute summary statistics and access probabilities from standard statistical distributions



Use of data in statistics

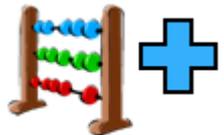
9. AS and A level mathematics specifications must require students to:

- become familiar with one or more specific large data set(s) in advance of the final assessment (these data must be real and sufficiently rich to enable the concepts and skills of data presentation and interpretation in the specification to be explored)
- use technology such as spreadsheets or specialist statistical packages to explore the data set(s)
- interpret real data presented in summary or graphical form
- use data to investigate questions arising in real contexts

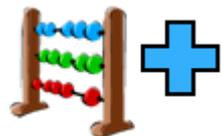
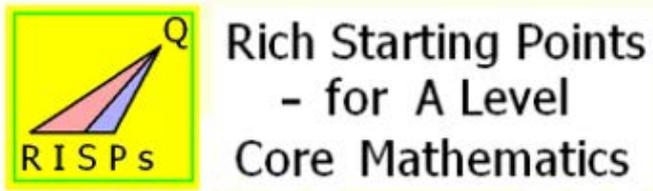
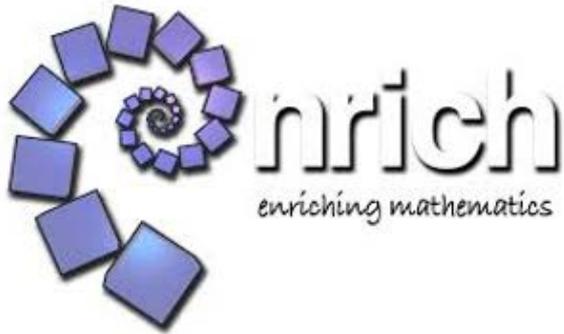


New linear A levels

- Examinations
- Questions
 - Less structure
 - Problem solving



A level support



2017 AS and A level entries – all subjects

AS level

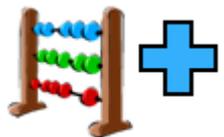
- Entries in 2016 dropped by 14% and this year they have fallen by a further 42%, as more of the available AS qualifications are ‘de-coupled’ and therefore AS results no longer count towards A level grades.

A level

- In general, A level entries are relatively stable.

Source: Ofqual blog 15 June 2017

<https://ofqual.blog.gov.uk/2017/06/15/2017-entry-data-things-to-look-out-for/>



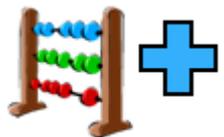
CORE MATHS

Core Maths: new qualification

‘Core Maths is the new Level 3 qualification for students who achieve a Grade 4 (formerly Grade C) at GCSE Maths and wish to develop their practical maths skills for the real world, be it in work, study or everyday life.’

AS level equivalence but not an AS level

Intentions: students retain, deepen and extend their mathematics from GCSE.



Core Maths: the story so far

October 2013: Advisory Committee on Mathematics Education (ACME) expert panel report on new qualifications

6 January 2014: Policy statement on the introduction of level 3 maths qualifications for post-16 students

14 April 2014: Consultation on new qualifications and Draft technical guidance for their design

Spring/Summer 2014: Launch of Core Maths Support Programme

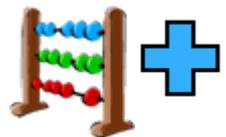
7 July 2014: Final technical guidance for Core Maths Qualifications published

Summer/Autumn 2014: Six Core Maths qualifications accredited

December 2014: Formal launch of Core Maths qualifications and early adopter projects

Summer 2016: First Core Maths examinations – c 3,000 entries

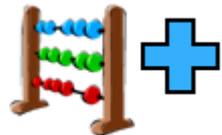
Summer 2017: Core Maths examinations – c 6,000 entries



Core Maths: where are we now?

Almost 3,000 students in around 200 centres sat the first round of Core Maths exams in May 2016.

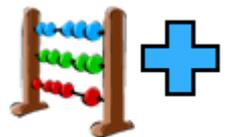
- Total entry figure of 2931
- Overall pass rate of 82% (grade E and above)
- 10% of entry achieved grade A
- Almost half (47%) achieved grade C or above



Findings from the analysis of a sample of unvalidated results from over 1600 students in just under 120 centres (1/3)

Entry patterns and outcomes

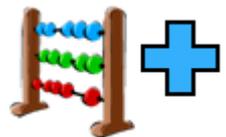
- A higher proportion of grade As were achieved by candidates in the Early Adopter schools and colleges (taught over 2 years).
- The proportion of students who did not get a pass grade was lower in the Early Developer schools and colleges (taught over 1 year).



Findings from the analysis of a sample of unvalidated results from over 1600 students in just under 120 centres (2/3)

Gender

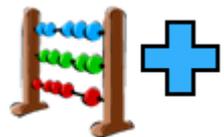
- The ratio of males to females of the sample was approximately 5:3, i.e 63% to 37%
- No large differences in achievement between male and female students.



Findings from the analysis of a sample of unvalidated results from over 1600 students in just under 120 centres (3/3)

Progression from GCSE

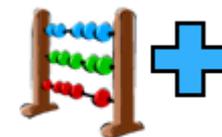
- There is positive correlation between GCSE mathematics grades and Core Maths results.
- The full range of Core Maths grades is available to GCSE mathematics grade B and grade C students.
- GCSE mathematics grade D does not appear to be a good starting point for Core Maths.



Core Maths – uptake*

Type of institution	Number of centres Teaching Core Maths			Total number of institutions	Percentage coverage		
	2014-15	2015-16	2016-17		2014-15	2015-16	2016-17
Schools with sixth forms	77	245	490	2104	4%	12%	23%
Sixth Form Colleges	14	33	52	95	15%	35%	55%
FE Colleges	54	68	96	225	24%	30%	43%
Studio schools / UTC	3	15	26	52	6%	29%	50%
Total	148	361	664	2476	6%	15%	27%

*taken from June 2017 CMSP briefing sheet



HE endorsement for Core Maths

London School of Economics

Warwick

Exeter

Southampton

York

Birmingham

Newcastle

Manchester

Queen Mary, University of London

Sheffield

Leeds

Nottingham

Durham

Edinburgh

Cardiff

Liverpool

UCL, University of London

Imperial College London

University of Cambridge

King's College London

Royal Holloway, University of London

Harper Adams

Essex

Surrey

Lancaster

Loughborough

Aston

Coventry

Nottingham Trent

Leeds Beckett

Hull

Buckingham

Sunderland

Bath

Kent

Leicester

Brighton

City, University of London

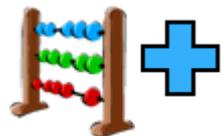
University of Reading

Goldsmiths

Sheffield Hallam

Plymouth

42 universities in
total including
24 of the Russell
Group

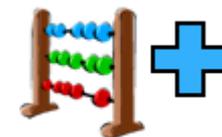


RSS support for Core Maths

Grow participation in Core Maths

- Core Maths has been designed for students who have an adequate or good grade in GCSE Mathematics, but who are not planning to take Mathematics at A Level. This pathway is intended to develop students' mathematical and statistical skills so that they can apply them in future no matter what they go on to specialise in.
- Studying Core Maths is different from studying for an A Level in mathematics: the size of the qualification is smaller than an A Level, and the content focuses on problem-solving rather than theory.
- We believe that this makes it appealing and compatible for students with good but not outstanding grades at GCSE; however it will be important to continue to support uptake of the qualification in schools and colleges if any greater difference is to be made.
- We think refining the quality of Core Maths provision and widening the uptake of the qualification needs explicit support, particularly from higher education providers, training providers and industry who should all signal their demand for Core Maths.

[Education and Skills for the data economy](#)

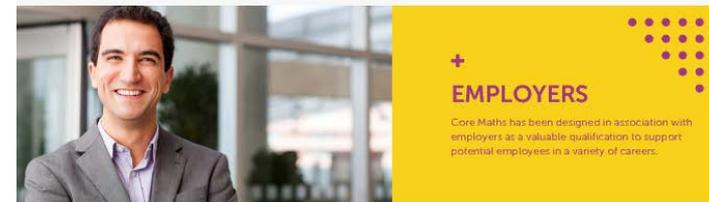
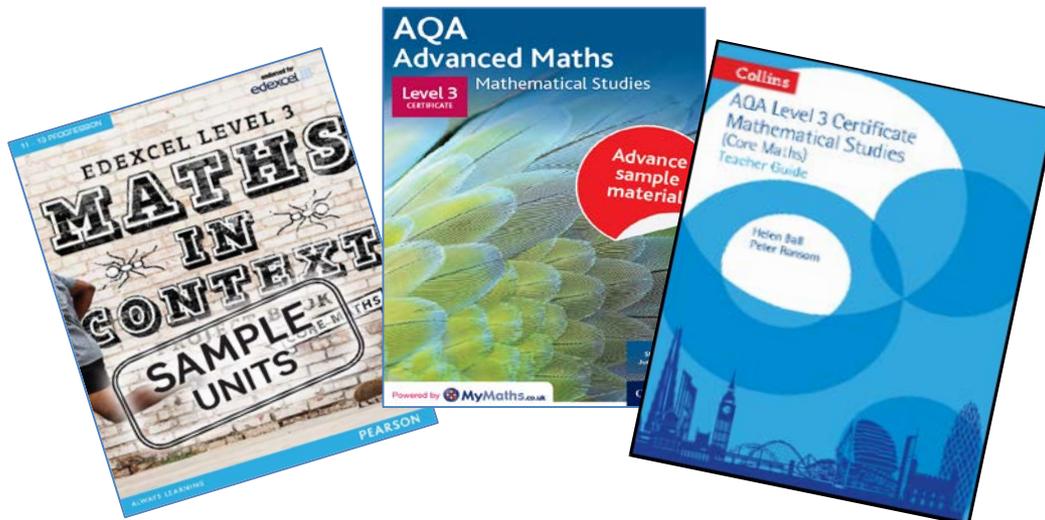


Core Maths – support

- Awarding Organisations



- Core Maths Support Programme
- Maths Hubs
- Publishers

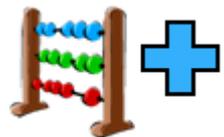


ADRIAN SMITH REPORT

Adrian Smith report: post-16 Maths Review

What was announced?

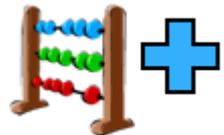
- In his 2016 budget speech the Chancellor told the Commons:
 - *“We are going to look at teaching maths to 18 for all pupils. Providing great schooling is the single most important thing we can do to help any child from a disadvantaged background succeed.*
 - *“It’s also the single most important thing we can do to boost the long-term productivity of our economy, because our nation’s productivity is no more and no less than the combined talents and efforts of the people of these islands.”*



Adrian Smith report: post-16 Maths Review

The published budget statement says:

- *The government will ask Professor Sir Adrian Smith to review the case for how to improve the study of maths from 16 to 18, to ensure the future workforce is skilled and competitive, including looking at the case and feasibility for more or all students continuing to study maths to 18, in the longer-term. The review will report during 2016.*



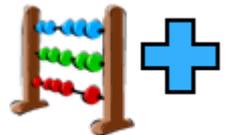
Adrian Smith report: post-16 Maths Review

- Presented to government in Dec 2016
- Informed green paper on ‘Building our Industrial Strategy’



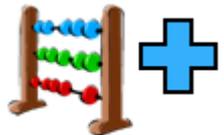
Building our Industrial Strategy

- Emerging evidence from Professor Sir Adrian Smith's independent review into post-16 maths provision points to a number of areas where action will need to be taken to improve basic mathematics provision in FE colleges. A total of 70 per cent of young people who do not achieve A*-C GCSEs in these vital subjects and who go on to full-time post-16 study, do so at FE colleges. Yet still too far many of these young people fail when they retake them.
- p40



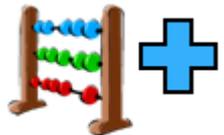
Building our Industrial Strategy

- Professor Sir Adrian Smith's review of post-16 mathematics has identified that one factor contributing to the shortage of STEM skills is the take up of advanced mathematics qualifications, including A level mathematics, further mathematics and core mathematics.
- p44



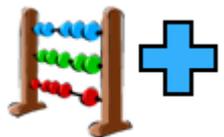
What has Adrian Smith said

- There are huge geographic variations in post-16 mathematics uptake.
- FE is a neglected area.
- About $\frac{3}{4}$ do **not** take maths post-16, more than the vast majority of other countries.
- Core Maths should remain available and be promoted.
- The type of post-16 maths should be decided in conjunction with the Institute of Apprenticeships and Universities.
- Universities should **require** mathematics for subjects such as psychology.



What has Adrian Smith said

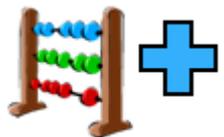
- The GCSE re-sit policy needs revisiting. It is not working and is placing a huge strain on the sector.
- Current funding mitigates against students studying Core Maths or Further Maths as a 4th A Level.
- 1 in 5 maths graduates would need to become teachers to meet the needs compared with 1 in 20 history graduates.
- An effective careers service need to be re-established.
- We need to think about what maths will be like in 20 years' time.



What has Adrian Smith said

- Medium Term
 - Ensure that students have the option to study maths
 - Providing students with clearer guidance at an early age
 - Strengthen the ‘pull’ to progress in maths from universities and employers
- Longer Term
 - Near universal participation within 10 years
 - Increased provision of appropriate pathways
 - Increased capacity to deliver
 - A culture that values mathematical and quantitative skills

Source: Level 3 Mathematics Conference 3/3/17 at Royal Society



POST-16 PROVISION FOR 2017

Post-16 provision for 2017

NEW GCSE GRADING STRUCTURE	CURRENT GCSE GRADING STRUCTURE
9	A*
8	A
7	A
6	B
5	B
4	C
3	D
2	E
1	F
U	G
U	U

GOOD PASS (DfE)
5 and above = top of C and above

AWARDING
4 and above = bottom of C and above

Compulsion

Grade 3 GCSE resit

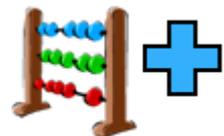
Grades 1&2 continue with Level 2 mathematics

Standard Pass(4) – drop the subject or Core Maths

Options

Strong Pass (5) – drop the subject, Core Maths or AS/A level

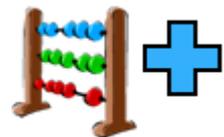
Grade 7– drop the subject, Core Maths or AS/A level, AS/A Further Maths



Deciding between Core Maths, AS and A level mathematics

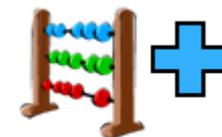
AS and A level mathematics	AS and A level further mathematics	Core Maths
<ul style="list-style-type: none"> • keeps options open for a wide range of university courses; • is essential for entry to many degree courses including most STEM and medicine, economics and architecture; • supports the mathematical elements of other A-level subjects; • introduces new ideas, applications and techniques such as - proof, calculus, modelling; and • offers more rapid progression for higher achieving students in mathematics. 	<ul style="list-style-type: none"> • introduces more sophisticated mathematical concepts and can boost students' marks in single A level Mathematics; • makes the transition from sixth form to university courses which are mathematically rich much easier; and • enables students to distinguish themselves as able mathematicians in their applications for university and future employment. 	<ul style="list-style-type: none"> • helps students maintain and further develop valuable mathematical skills for university and employment; • helps with the mathematical elements of other level 3 courses, including humanities and social sciences; • builds valuable skills through an emphasis on mathematical problem solving in real life contexts; and • provides an option which is suitable for all students with a good pass at GCSE.

Students should ideally follow the course that has the most advanced mathematics they are capable of.



What advice would you give?

Student	Jo	Hilary	Alex	George	Chris
GCSE Maths Grade	6	8	5	7	6
A level options	Chemistry Biology Psychology	Physics Chemistry Biology	Psychology Geography RE	English History French	Engineering BTEC
Ambition	Vet	Medicine	Unsure	Uni – humanities/ languages	Engineer



Reference

Mathematics: GCSE subject content and assessment objectives

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/254441/GCSE_mathematics_subject_content_and_assessment_objectives.pdf

Core maths qualifications: technical guidance July 2015

http://www.core-maths.org/media/2076/core-maths-technical-guidance_-_july-2015.pdf

Mathematics AS and A level content April 2016

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/516949/GCE_AS_and_A_level_subject_content_for_mathematics_with_appendices.pdf

Letter from Education Secretary to the Education Select Committee Chair

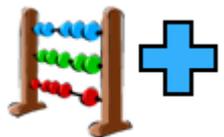
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/603594/ESC_letter.pdf

GCSE mathematics: understanding schools' approaches to tiering

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/591000/2017-02-10_Report_on_maths_tiering.pdf

RSS: Education and skills for the data economy

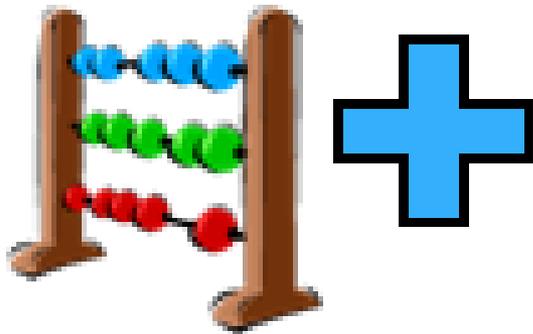
http://www.rss.org.uk/RSS/Influencing_Change/Data_manifesto/Education_and_skills_for_the_data_economy/RSS/Influencing_Change/Data_democracy_sub/Education_and_skills_for_the_data_economy.aspx



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