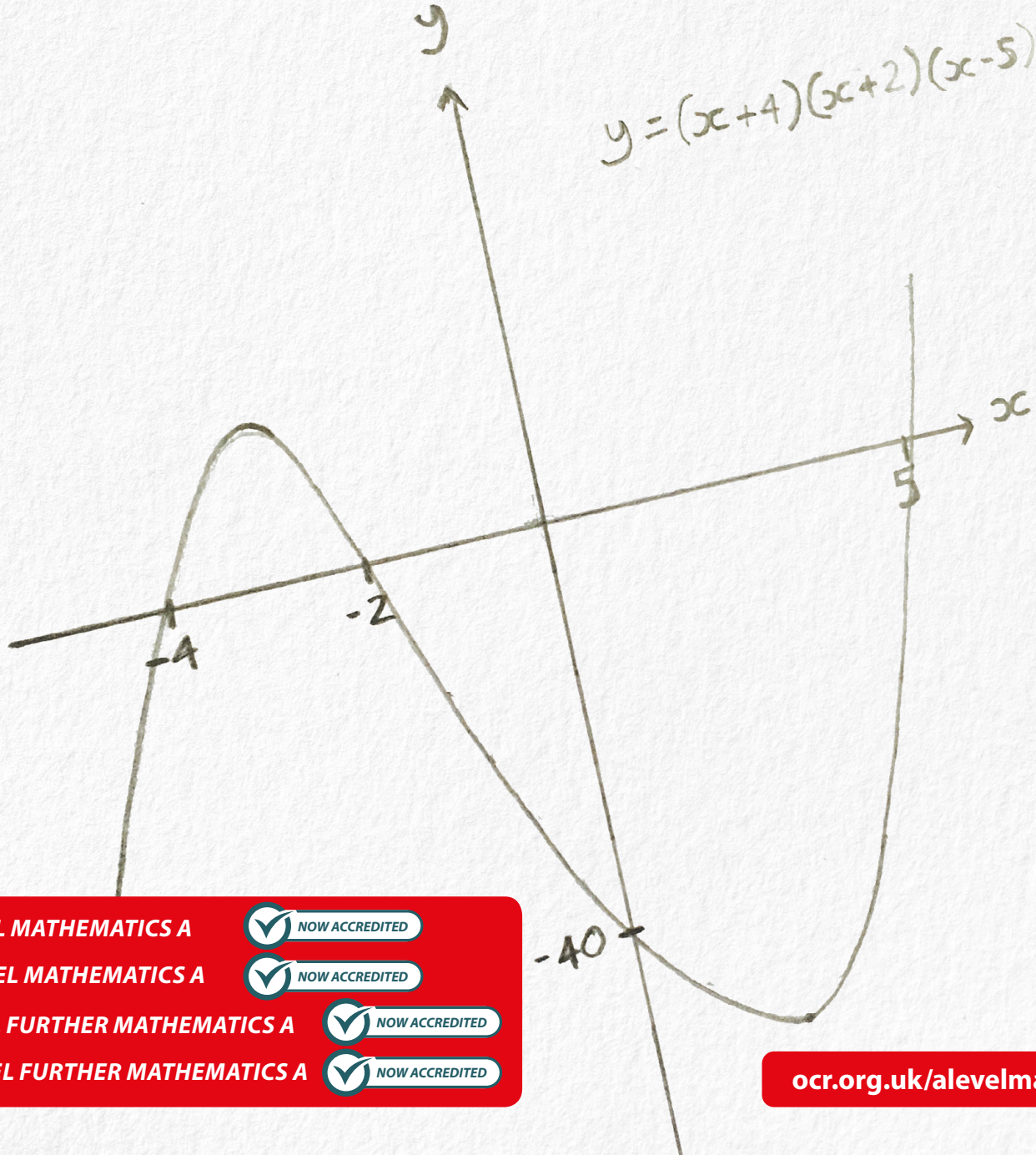
OCR
Oxford Cambridge and RSA

STAY AHEAD OF THE CURVE

with OCR's new linear A levels in Mathematics and Further Mathematics

SUMMARY GUIDE



A LEVEL MATHEMATICS A NOW ACCREDITED
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A LEVEL FURTHER MATHEMATICS A NOW ACCREDITED
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ocr.org.uk/alevelmaths

OUR GUIDE

TO AS AND A LEVEL MATHEMATICS AND FURTHER MATHEMATICS A

The spotlight of A level reform in 2017 falls on Mathematics and Further Mathematics with the most significant changes to the teaching of AS and A level for more than sixteen years.

There will be new linear specifications for first teaching from September 2017, which means that all assessments are taken at the end of the course.

Mathematics is the most popular A level taken in schools today so it's vital that the new qualifications work for teachers and learners alike.

This summary brochure provides you with an overview of our OCR A specification and assessment approach, as well as how we will support you through the linear changes.

FIRST ASSESSMENTS

- The first assessments for A level Mathematics, AS level Mathematics and AS level Further Mathematics will be in **June 2018.**
- The first assessments for A level Further Mathematics will be in **June 2019.**

WHY CHOOSE OUR MATHEMATICS A SUITE?

OCR Mathematics A has been developed to provide students with a coherent course of study to develop mathematical understanding. Students are encouraged to think, act and communicate mathematically, providing them with the skills to analyse situations in mathematics and elsewhere. It is based on our experience of what works well in the classroom, providing clear subject progression and teacher support.

KEY CHANGES

How are AS and A level Mathematics and Further Mathematics changing?

- **Linear assessment:**
  All assessments for AS and A level Mathematics and Further Mathematics are linear, with 100% by examination, which means that all the exams are sat at the end of the course.

- **Statistics and mechanics are compulsory:**
  AS and A level Mathematics have 100% prescribed content, containing both pure and applied mathematics, which means that there are no options available to choose. All AS and A Level Mathematics learners will now study both statistics and mechanics.

- **Large data sets:**
  AS and A level Mathematics learners experience working with real data in the classroom and explore this data using appropriate technology.

- **Use of technology and calculators:**
  It is assumed that learners will have access to appropriate technology with scientific or graphical calculators available for all exams, and that they will be introduced to the wider use of technology in mathematics in their teaching and learning

- **Mathematical understanding:**
  There is increased focus on problem solving, mathematical argument, reasoning and modelling.

- **Choices at Further Mathematics:**
  At AS level Further Mathematics and A level Further Mathematics, there is a compulsory core of pure mathematics ($33^1/_3$% at AS level and 50% at A level), with the remainder of the course made up of options for the topics you teach. This means that you can choose topics that meet the needs and interests of your learners.

The level of demand in the new reformed qualifications is the same as in the existing AS and A level Mathematics and Further Mathematics qualifications.

WHAT'S IN THIS GUIDE?

MATHEMATICS A

SPECIFICATION OVERVIEW

A LEVEL MATHEMATICS A
AS LEVEL MATHEMATICS A

NOW ACCREDITED

The following overarching themes are applied across the whole of the content of AS and A level Mathematics:

- Mathematical argument, language and proof
- Mathematical problem solving
- Mathematical modelling.

The content is separated into three areas: pure mathematics, statistics and mechanics. Learners are expected to have explored the connections between different areas of the specification.

CONTENT AREA	CONTENT OVERVIEW
1 ***PURE MATHEMATICS***	**AS & A level:** Pure mathematics includes proof, algebra, graphs, sequences, trigonometry, logarithms, calculus and vectors. **A level only:** Learners study these topics in more depth and also study functions, numerical methods and differential equations.
2 ***STATISTICS***	**AS & A level:** Statistics includes working with data from a sample to make inferences about a population, probability calculations, using binomial distribution as a model, and statistical hypothesis testing. **A level only:** Learners study these topics in more depth and also study the normal distribution. There is a pre-release data set for both AS and A level. The purpose of the large data set is that learners experience working with real data in the classroom and explore this data using appropriate technology.
3 ***MECHANICS***	**AS & A level:** Mechanics includes kinematics, working with forces and Newton's Laws. **A level only:** Learners study these topics in more depth, and also study motion under gravity, friction and simple moments.

ASSESSMENT OVERVIEW

A LEVEL MATHEMATICS A

Learners must take all components 01, 02 and 03 to be awarded OCR's A level in Mathematics A and are permitted to use a scientific or graphical calculator for all papers. In addition to the content indicated below, question papers will also address the overarching themes.

COMPONENT	MARKS	DURATION	WEIGHTING
Paper 1: Pure Mathematics (01) The assessment has a gradient of difficulty throughout the paper and consists of a mix of short and long questions.	100	2 hours	33 1/3%
Paper 2: Pure Mathematics and Statistics (02) The assessment is structured in two sections of approximately 50 marks each: pure mathematics and statistics. Each section has a gradient of difficulty throughout the section and consists of a mix of short and long questions.	100	2 hours	33 1/3%
Paper 3: Pure Mathematics and Mechanics (03) The assessment is structured in two sections of approximately 50 marks each: pure mathematics and mechanics. Each section has a gradient of difficulty throughout the section and consists of a mix of short and long questions.	100	2 hours	33 1/3%

AS LEVEL MATHEMATICS A

Learners must take both components 01 and 02 to be awarded OCR's AS level in Mathematics A and are permitted to use a scientific or graphical calculator for all papers. In addition to the content indicated below, question papers will also address the overarching themes.

COMPONENT	MARKS	DURATION	WEIGHTING
Paper 1: Pure Mathematics and Statistics (01) The assessment is structured in two sections: approximately 50 marks of pure mathematics and approximately 25 marks of statistics. Each section has a gradient of difficulty throughout the section and consists of a mix of short and long questions. Some questions will be set on the pre-release data set.	75	1 hour 30 mins	50%
Paper 2: Pure Mathematics and Mechanics (02) The assessment is structured in two sections: approximately 50 marks of pure mathematics and approximately 25 marks of mechanics. Each section has a gradient of difficulty throughout the section and consists of a mix of short and long questions.	75	1 hour 30 mins	50%

FURTHER MATHEMATICS A

SPECIFICATION OVERVIEW

A LEVEL FURTHER MATHEMATICS A
AS LEVEL FURTHER MATHEMATICS A

NOW ACCREDITED

The following overarching themes should be applied across the whole of the content of AS and A level Further Mathematics:

- Mathematical argument, language and proof
- Mathematical problem solving
- Mathematical modelling.

The content is separated into five areas: pure core, statistics, mechanics, discrete mathematics and additional pure mathematics. All learners must study the pure core and two of the optional areas.

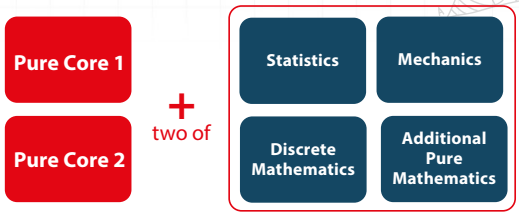
CONTENT AREA	CONTENT OVERVIEW
1 ***PURE CORE***	Learners will extend and deepen their knowledge of proof, algebra, functions, calculus and vectors studied in AS and A level Mathematics. They will broaden their knowledge into other areas of pure mathematics that underpin the further study of mathematics and other numerate subjects with complex numbers and matrices. At A level, learners study these topics in more depth and also study differential equations, polar coordinates and hyperbolic functions.
2 ***STATISTICS***	Learners will explore the theory that underlies the statistics content in A level Mathematics, as well as extending their tool box of statistical concepts and techniques. This area covers combinatorics, probability distributions for discrete random variables, chi-squared tests, correlation and regression. At A level, learners study these topics in more depth and also study probability distributions for continuous random variables, non-parametric tests, hypothesis tests and confidence intervals for a population mean.
3 ***MECHANICS***	Learners extend their knowledge of particles, kinematics and forces from A level Mathematics, using their extended pure mathematical knowledge to explore more complex physical systems. The area covers dimensional analysis, work, energy, power, impulse, momentum and circular motion. At A level, learners study these topics in more depth and also study the application of vectors across the topics, centres of mass and variable force.
4 ***DISCRETE MATHEMATICS***	Discrete mathematics is the part of mathematics dedicated to the study of discrete objects. Learners will study pure mathematical structures and techniques, and their application to solving real-world problems of existence, construction, enumeration and optimisation. Areas studied include counting, graphs and networks, algorithms, critical path analysis, linear programming, and game theory. At A level, learners study these topics in more depth, extending them to Hamiltonian and planar graphs, the simplex algorithm and the Nash equilibrium.
5 ***ADDITIONAL PURE MATHEMATICS***	In Additional pure mathematics, learners will broaden and deepen their knowledge of pure mathematics, studying both discrete and continuous topics which form the foundation of undergraduate study in mathematics and mathematical disciplines. This area covers recurrence relations, number theory, group theory, the vector product, surfaces and partial differentiation. At A level, learners study these topics in more depth, in particular extending number theory and partial differentiation, and extending the integration techniques covered in the Pure core.

ASSESSMENT OVERVIEW

A LEVEL FURTHER MATHEMATICS A

All learners must take the two mandatory Pure Core papers and any two of the optional papers.

Learners may take more than two optional papers to increase the breadth of their course. The combination of papers that result in the best grade will be used.

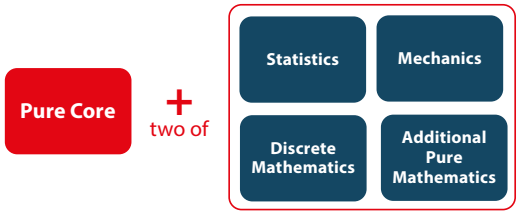


PAPER	MARKS	DURATION	WEIGHTING
Assess content from the whole of the pure core, and all of the overarching themes.			
Pure Core 1	75	1 hour 30 mins	25%
Pure Core 2	75	1 hour 30 mins	25%
OPTIONAL PAPERS (choose any two) These papers assess the relevant content area and all of the overarching themes			
Statistics	75	1 hour 30 mins	25%
Mechanics	75	1 hour 30 mins	25%
Discrete Mathematics	75	1 hour 30 mins	25%
Additional Pure Mathematics	75	1 hour 30 mins	25%

AS LEVEL FURTHER MATHEMATICS A

All learners must take the mandatory Pure Core paper and any two of the optional papers.

Learners may take more than two optional papers to increase the breadth of their course. The combination of papers that result in the best grade will be used.



PAPER	MARKS	DURATION	WEIGHTING
Pure Core Assesses content from the pure core, and all of the overarching themes.	60	1 hour 15 mins	$33\frac{1}{3}$%
OPTIONAL PAPERS (choose any two) These papers assess the relevant content area and all of the overarching themes			
Statistics	60	1 hour 15 mins	$33\frac{1}{3}$%
Mechanics	60	1 hour 15 mins	$33\frac{1}{3}$%
Discrete Mathematics	60	1 hour 15 mins	$33\frac{1}{3}$%
Additional Pure Mathematics	60	1 hour 15 mins	$33\frac{1}{3}$%

All assessments have an increasing gradient of difficulty through the paper and consist of a mix of short and long questions.

MOVING TO LINEAR

In our discussions with teachers about A level reform and moving from modular to linear qualifications, many have highlighted the need to develop a different approach.

Planning content coverage for a linear qualification requires a more holistic and synoptic approach. The relationship between different topics, revisiting of concepts and skills, and opportunities for formative assessment all need to be considered and planned.

Our teacher-friendly specifications have been designed specifically by teachers for teachers to use in their day-to-day teaching, exemplifying a linear approach to teaching and learning.

Our new editable two-year A level scheme of work provides help for teachers to plan a holistic linear course that best meets the needs of their learners. It provides guidance on building a spiralled approach to teaching A level Mathematics, so that topics can be revisited and built upon to help develop a deep mathematical understanding.

Linear assessment provides opportunities for longer-term development of understanding and skills. Progress is monitored through regular assessment of learning.

We are developing a new resource bank of topic-based assessments that can be used throughout a linear course to help teachers to regularly assess their students' learning and track their progress.

Three sets of practice papers, in addition to the sample papers, will be available to support mock examinations and revision.

TEACHING MECHANICS FOR THE FIRST TIME

Talking to Mathematics teachers about A level Mathematics reform and the 100% prescribed content has highlighted that they may be teaching mechanics for the first time from September 2017.

Our teacher-friendly specifications provide specific help and guidance for teachers teaching mechanics for the first time. In addition, our new Delivery Guide explains mechanics concepts and suggests teaching approaches, with specific guidance on teaching pure mathematics in the context of mechanics.

We are also developing a programme of CPD to support teachers new to teaching mechanics.

WORKING WITH LARGE DATA SETS

Large data sets are a new feature for all reformed A level Mathematics qualifications.

The purpose of the large data set is that learners experience working with real data in the classroom and explore this data using appropriate technology. It is intended to enrich the teaching and learning of statistics.

Our Delivery Guide is specifically aimed at providing help and guidance for teachers to embed large data sets in their teaching and learning of statistics. In addition, we are working with practising teachers, who are using large data sets in their teaching, to develop free classroom resources for teachers to use.

ACCESSING TECHNOLOGY

It is now assumed that learners will have access to appropriate technology when studying A level Mathematics and Further Mathematics courses, such as mathematical and statistical graphing tools and spreadsheets. When embedded in the Mathematics classroom, the use of technology can reduce the burden of computation, facilitate the visualisation of abstract concepts and deepen learners' overall understanding.

Learners are permitted to use a scientific or graphical calculator for all papers.

Our teacher-friendly specifications provide specific help and guidance for teachers to exemplify how to use technology to support teaching and learning.

Our mark schemes show clearly how marks are awarded for all question types, including where calculators are used.

SUPPORTING YOU AS YOU TEACH

We aim to support you effectively from your initial enquiry right through to results day. To get off to a great start, take advantage of all the support we provide for AS and A level Mathematics and Further Mathematics.

CPD training and teacher networks – including online webinars, face-to-face CPD training and teacher networks.
ocr.org.uk/alevelmathscpd

Teaching and learning resources – a wide range of Delivery Guides, transition guides, topic exploration packs, lesson elements.

Assessment preparation support – sample assessment materials, Skills Guides, Active Results and practice papers.

Published resources – we're working with Cambridge University Press who are publishing textbooks and digital resources for the new AS and A level Mathematics A and Further Mathematics A specifications, to make sure that the resources embed the fundamental content of each specification, while delivering the breadth and depth needed to succeed at A Level and beyond.
ocr.org.uk/publishing-partners

Meet the OCR Mathematics Team – our Mathematics Subject Advisors are committed to supporting you throughout the delivery of the specifications, with specialist advice, guidance and support.
ocr.org.uk/mathsteam

ABOUT OCR MATHEMATICS AND FURTHER MATHEMATICS B (MEI)

If OCR Mathematics and Further Mathematics A are not for you, check out our OCR Mathematics and Further Mathematics B (MEI) suite.

OCR Mathematics and Further Mathematics B (MEI) specifications have been developed by Mathematics in Education and Industry (MEI) and are delivered and administered by OCR. This is a well-established partnership that provides a firm foundation for curriculum and qualification development.

WHY CHOOSE OCR MATHEMATICS AND FURTHER MATHEMATICS B (MEI)?

Both specifications:

- encourage learners to develop a deep understanding of mathematics and an ability to use it in a variety of contexts
- encourage learners to use appropriate technology to deepen their mathematical understanding and extend the range of problems they can solve
- use pre-release data in statistics to enable learners to develop an understanding of working with real data to solve real problems
- are assessed in a way that enables all learners to show what they can do
- include mathematical comprehension in the assessment to prepare learners to use mathematics in a variety of contexts in higher education and future employment.

Further Mathematics B (MEI):

- offers a choice between breadth and depth in Further Maths options with Major and Minor papers
- offers a wide range of possible options, including a unit on Numerical Methods, and the Further Pure with Technology paper which includes use of a computer in the assessment.

MEI is a long-established, independent curriculum development body. Through development MEI has consulted with teachers and representatives from higher education, enabling these qualifications to best meet the long-term needs of learners. MEI provides advice and CPD relating to all the curriculum and teaching aspects of the course, along with teaching resources for these specifications.

www.mei.org.uk.

NEXT STEPS

1

Download the specification –

ocr.org.uk/alevelmaths

2

Book CPD Training –

ocr.org.uk/alevelmathscpd

3

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