ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Mathematics

Teachers' Guide

Advanced Subsidiary Mathematics (5361)
Advanced Subsidiary Pure Mathematics (5366)
Advanced Subsidiary Further Mathematics (5371)

Advanced Mathematics (6361)
Advanced Pure Mathematics (6366)
Advanced Further Mathematics (6371)

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Background Information

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Introduction

This Teachers' Guide has been provided to assist teachers and lecturers in their preparation for the delivery of courses based on the new AQA Advanced Subsidiary (AS) and Advanced Level (A Level) in Mathematics. The guide should be read in conjunction with the specification and the specimen material that accompanies it. These are available in hard copy and on the AQA Website www.aqa.org.uk.

All Advanced Supplementary and Advanced Level syllabuses were replaced from September 2000 by GCE specifications following the Dearing *'Review of Qualifications for 16-18 Year Olds'* and the subsequent consultation *'Qualifying for Success'*. The GCE Mathematics specifications, complying with criteria produced by the Qualifications and Curriculum Authority (QCA), were associated with various problems, but particularly a significant reduction in take-up of Mathematics in the post-16 age group. As a consequence, QCA has rewritten the criteria and all awarding bodies in England, Northern Ireland and Wales have developed new GCE Mathematics specifications for first teaching from September 2004.

The new AQA GCE Mathematics specification has qualifications at AS and A Level in Mathematics, Pure Mathematics and Further Mathematics. It has been developed from the previous specifications, AQA Mathematics A (6300) and AQA Mathematics and Statistics B (6320).

In producing the new specification AQA has, wherever possible, preserved features of the previous specifications which are attractive to teachers and their students, and has maintained as much flexibility as possible. In AS and A Level Mathematics, there is the option to do internally assessed coursework as part of some Applied units, but these units are also available as written paper only units. There are many routes to AS and A Level Further Mathematics, and AS Further Mathematics can comprise AS assessment only.

Some changes are a consequence of the rewritten QCA criteria. The amount of Pure Mathematics is slightly smaller than previously, but its weighing within AS or A Level Mathematics is greater. All units are equally weighted, with the Pure Core material equally divided into four of the six units (two of the three for AS). The two remaining Applied units can both be at AS standard, enabling two different applications to be studied (they can be in the same application, in which case one will be at AS and one at A2 standard).

The rewritten QCA criteria do not permit the inclusion of subject awards in Statistics within GCE Mathematics. AQA has developed a separate GCE Statistics specification, offering qualifications in AS Statistics and A Level Statistics. There are further details in section 13 of this Guide.

2 Where to find information

2.1 Specification, Specimen Material and Teachers' Guide

This Teachers' Guide is intended to complement the information in the Specification and in the Specimen Material. The Specification gives full details of the teaching and learning modules, and of the assessment units that lead to the qualifications AS and A Level Mathematics, Pure Mathematics and Further Mathematics. The Specimen Material contains an example of the question paper and the mark scheme for each assessment unit, together with an assessment grid showing how the paper covers the subject content of the module and how it complies with the specified proportions of different types of assessment.

The Teachers' Guide supplements these documents with information such as designing courses based on the Specification, guidance about specific content, resources and administrative matters. It also gives details of how the Specification relates to previous AQA Specifications(s), and which past paper questions are appropriate for practice for this Specification.

2.2 Formulae book

Formulae that candidates can look up and statistical tables they can use during examinations are published in a Formulae Book. Candidates should have a copy of the Formulae Book whenever they sit an AS or A2 Mathematics question paper. Teachers will want to use the Formulae Book in class- and home-work so that students become familiar with it.

AQA will issue a new Formulae Book for use with this Specification. A single Formulae Book will be issued for the new GCE mathematics and the new GCE Statistics specifications. This Formulae Book will be different to the book issued for the C2K specifications; for example, it will contain additional Pure Mathematics formulae. Centres should therefore ensure that they use the new Formulae Book (easily identifiable by its blue cover) and discard previous versions.

The new Formulae Book will be available for the start of teaching in September 2004. Copies will be sent to centres early in Autumn term 2004 on the basis of Estimated Entry data provided by Examinations Officers in centres. Sufficient copies will be sent to provide one copy for classroom and homework use for each student, plus an appropriate number of copies to be kept by the Examinations Officer as clean copies for examination use only. In subsequent years a top-up supply will be sent, together with an order form for centres to use to obtain additional copies when needed.

2.3 Practice papers

Past papers from live examinations are subject to much more careful preparation than practice papers, so AQA has preferred to offer additional examinations in many units one or two series before most candidates on a 2-year course will sit them, rather than produce practice papers for all units. Some units have been identified where a practice paper would serve a particular purpose e.g. for some early AS and some Further Applied units. AQA is preparing practice papers for these units, which are MPC1, MPC2, MFP1, MS03, MS04, MM03, MM04, and MM05.

2.4 Coursework packs	Some details about coursework are included in the Specification. Further information is given in *Teachers' Coursework Guidance Packs* prepared for each unit with optional coursework (MS1A, MS2A, MM1A, MM2A). These packs contain a task sheet with AQA-recommended tasks, together with samples of candidates' work showing how it is assessed against the coursework criteria. Copies of the coursework packs will be sent in the Autumn term to all centres making Estimated Entries for one of the above units. Copies are also available from the GCE Mathematics subject department.
2.5 Coursework Advisers	Every centre undertaking coursework is assigned a Coursework Adviser, who should be consulted if a centre wishes to use a coursework task not on the AQA-recommended list, but who can also advise on other matters such as the application of the criteria.
2.6 Website	Information about this GCE Mathematics specification can be found at www.aqa.org.uk/qual/gceasa/mathematics.html.
2.7 Meetings	AQA regularly holds two kinds of meetings for teachers of AS and A Level Mathematics. Each Autumn, teacher standardisation meetings are held to ensure that teachers have a good understanding of the standard required for coursework. When a centre first does coursework for this specification, AQA requires that a representative from the centre attends one of these meetings. Centres will be invited on the basis of Estimated Entries information. There is no charge for these meetings. AQA also holds support meetings. These give advice on aspects of teaching the specification content, information about administrative matters, and feedback on candidate performance in past papers. There may be a charge for these meetings. Details about the meetings are posted to the AQA website, and meetings are bookable online.
2.8 Examinations Update	This booklet is sent 5 times a year to Examinations Officers. Any changes to administrative requirements or to the specification content are notified to centres through the Update. Where information is subject specific, separate sheets are included for distribution to Heads of Department. The Update is also published on the AQA website, with, if appropriate, links to the relevant page for the subject.
2.9 Mailing List	The GCE Mathematics subject department has a mailing list of named individuals who wish to be kept up-to-date with developments in AQA GCE Mathematics. From time to time, information published elsewhere is also sent direct to individuals on the list.

3 Contact points

GCE Mathematics subject department	AQA, Stag Hill House, Guildford, Surrey, GU2 7XJ tel no 01483 477 752 e-mail mathematics-gce@aqa.org.uk
GCE Statistics FSMQ AS Use of Mathematics	as above
GCSE Mathematics subject department	AQA, Devas Street, Manchester, M15 6EX tel no 0161 958 3852 e-mail mathematicsgcse@aqa.org.uk
GCSE Statistics ELC Mathematics	as above
Teacher Support Department- Mathematics	tel no 01483 477 859 e-mail teachersupport@aqa.org.uk

Assessment of the Course

4 Specification at a Glance

4.1 General

All assessment units are weighted at 16.7% of an A Level (33.3% of an AS). Three units are required for an AS subject award, and six for an A Level subject award.

The subject content in the specification is divided into teaching modules, and each assessment unit examines one teaching module. Pure Core, Further Pure and Decision Mathematics units do not have coursework and there is only one assessment unit for each teaching module. This is also the case for the Further Statistics and Further Mechanics modules.

The modules Statistics 1, Statistics 2, Mechanics 1 and Mechanics 2 have two alternative assessment units, one with a written paper and coursework, the other with a written paper only. In units with coursework, the coursework contributes 25% towards the marks for the unit, and the written paper 75% of the marks.

The papers for units without coursework are 1 hour 30 minutes in duration and are worth 75 marks.

The papers for units with coursework are 1 hour 15 minutes in duration and are worth 60 marks.

The following tables summarise the units available for AS and A Level Mathematics and Pure Mathematics. Refer to the specification for the detailed rules about allowed combinations.

4.2 AS Mathematics

Comprises 3 AS units. Two units are compulsory.

MPC1*	+	MPC2	+	MS1A	or	MS1B	or	MM1A	or	MM1B	or	MD01

4.3 A Level Mathematics

Comprises 6 units, of which 3 or 4 are AS units. Four units are compulsory.

MPC1*	+	MPC2	+	MS1A	or	MS1B	or	MM1A	or	MM1B	or	MD01

together with

MPC3	+	MPC4	+	MS1A	or	MS1B	or	MM1A	or	MM1B	or	MD01

			or	MS2A	or	MS2B	or	MM2A	or	MM2B	or	MD02

Notes

* – calculator not allowed

shaded box – unit includes coursework assessment

4.4 AS Pure Mathematics

Comprises 3 compulsory AS units.

MPC1* + MPC2 + MFP1

4.5 A Level Pure Mathematics

Comprises 3 AS units and 3 A2 units. Five are compulsory.

MPC1* + MPC2 + MFP1

together with

MPC3 + MPC4 + MFP2 or MFP3 or MFP4

4.6 AS and A Level Further Mathematics

A wide range of units (listed below) can be used towards subject awards in AS and A Level Further Mathematics. Refer to the specification for the detailed rules about allowed combinations.

Further Pure 1	MFP1	AS
Further Pure 2	MFP2	A2
Further Pure 3	MFP3	A2
Further Pure 4	MFP4	A2
Statistics 1A	MS1A	AS with coursework
Statistics 1B	MS1B	AS without coursework
Statistics 2A	MS2A	A2 with coursework
Statistics 2B	MS2B	A2 without coursework
Statistics 3	MS03	A2
Statistics 4	MS04	A2
Mechanics 1A	MM1A	AS with coursework
Mechanics 1B	MM1B	AS without coursework
Mechanics 2A	MM2A	A2 with coursework
Mechanics 2B	MM2B	A2 without coursework
Mechanics 3	MM03	A2
Mechanics 4	MM04	A2
Mechanics 5	MM05	A2
Decision 1	MD01	AS
Decision 2	MD02	A2

The subject award AS Further Mathematics requires three units, one of which is chosen from MFP1, MFP2, MFP3 and MFP4, and two more units chosen from the list above.

The subject award A Level Further Mathematics requires six units, two of which are chosen from MFP1, MFP2, MFP3 and MFP4, and four more units chosen from the list above.

5 Assessment Issues

5.1 Introduction

This section covers a number of issues which relate to assessment units, including their aggregation into subject awards.

5.2 Calculators

The rules about using calculators in GCE Mathematics examinations have changed. For the previous specifications, there are units in which candidates can only use a scientific calculator, and others in which they are allowed to use a graphics calculator.

For this specification, except in Pure Core 1 (MPC1), candidates are allowed to use any calculator which complies with the rules in the *JCQ Instructions for the Conduct of Examinations*. Allowed calculators include graphics calculators. In many units in this specification, candidates actually need a graphics calculator, and therefore AQA states for all units where a calculator may be used that the calculator should be a graphics one.

MPC1 is a non-calculator paper and candidates are not allowed to use any kind of calculating aid (graphics calculator, scientific calculator, slide rule,….).

5.3 Coursework and non-coursework units

Statistics 1, Statistics 2, Mechanics 1 and Mechanics 2 can be assessed either by written paper and coursework (unit codes with A) or by written paper only (unit codes with B). Both versions of the written paper assess the whole content of the relevant teaching module, whether or not coursework is included in the assessment. However, it is likely that the B papers, which have 75 marks compared to 60 for the A papers, will have a higher proportion of marks on parts of the content which candidates will have to use in coursework, such as modelling in Mechanics.

5.4 Common Statistics 1 unit

The Statistics 1 assessment units, MS1A and MS1B, in this specification are identical to the Statistics 1 units, SS1A and SS1B, in the AQA GCE Statistics specification. (The teaching module is also identical.)

In any given examination series, candidates can be entered for only one of MS1A, MS1B, SS1A or SS1B, but over different series they can take any of the versions of S1. So candidates can have several results for each of the entry codes MS1A, MS1B, SS1A and SS1B.

When AQA receives a subject award entry, results for MS1A/B will be used only for aggregations within the GCE Mathematics specification and results for SS1A/B only for aggregations within the GCE Statistics specification. So aggregation of a GCE Mathematics subject award will not 'use up' results for SS1A/B; and aggregation of a GCE Statistics subject award will not 'use up' results for MS1A/B.

5.5 Transfer of S1 results

Centres will be able to request that a result under one entry code is transferred to the code for the equivalent unit from the other specification e.g. from MS1A to SS1A, or from SS1B to MS1B. This is so that candidates who start, for example, an AS Maths course and do MS1A but who decide to change to AS Statistics can use a result for MS1A as a result for SS1A.

AQA will not transfer results from one entry code to another unless asked by a centre. This is to prevent AQA's computer using up a candidate's result for, say, SS1A towards AS Maths when the candidate wanted it use it for AS Statistics. For example the candidate might be taking AS Maths with C1, C2 and D1 at the same time as AS Statistics with S1, S2 and S3.

Where the assessment is the same, the associated documentation will be the same. Common codes will be used when a document could be used for either GCE Maths or GCE Statistics. The common codes are:

for Statistics 1A written paper	MS/SS1A/W
for Statistics 1A coursework	MS/SS1A/C
for Statistics 1B written paper	MS/SS1B.

These or similar codes will appear on the exam papers, attendance lists, candidate record forms and so on. This means that centres won't have to make sure the exam paper given to each candidate matches the entry code they were entered under.

5.6 Aggregation rules

The Entry, Aggregation and Certification rules for GCE, VCE and GNVQ qualifications apply to all GCE qualifications. Additional rules apply to GCE Mathematics, and these are laid out in a separate document, entitled 'New GCE Mathematics Specifications from September 2004 – Entry, Aggregation and Certification Rules'.

It should be noted that it is not possible for centres or candidates to specify which units should be used towards any Mathematics qualification. The combinations of units used are determined according to the Mathematics rules referred to above.

It is advised in the Mathematics rules, and is worth noting here, that certificating AS Further Mathematics or A level Mathematics before the end of the course is inadvisable, due to the possibility of using up unit results which could improve the grade of, or be required for, a later award.

No overlap will be allowed between AS Further Mathematics and A level Mathematics, or between A level Mathematics and A level Further Mathematics. In certain circumstances, overlaps are permitted in some other qualification combinations, provided the correct number of units has been taken overall. The Mathematics rules provide further details.

6 Coursework Issues

6.1 Introduction

Four of the units in this specification, Statistics 1, Statistics 2, Mechanics 1 and Mechanics 2, may include coursework as part of the assessment.

Some advantages of candidates undertaking coursework are:

- it provides the opportunity to conduct an extended piece of mathematical reasoning;
- it enhances understanding of the particular area of content;
- it develops the Key Skills and generates evidence for their assessment;
- it provides the opportunity to attempt 'real-life' problems and interpret them within context.

The submission of **one** piece of coursework is required for GCE Mathematics. A piece of coursework is expected to represent approximately 8 to 10 hours' work.

The fact that coursework is optional in the four units in which it is offered gives teachers a lot of flexibility. For example, teachers may enter some candidates for the A option (coursework + written paper) and others for the B option (written paper only). Another example is when candidates begin coursework but are unable to finish, or perform poorly, teachers could choose to change their entries for such candidates to the non-coursework option.

Coursework in this specification will be largely familiar to centres who previously taught AQA GCE Mathematics Specification A (6300). Most of the tasks remain the same, although a few have changed. The main difference is in Statistics 1, which will now be assessed at AS standard instead of A2 standard.

It is hoped that centres choosing to try coursework for the first time will be comfortable with the format and systems, and will find the transition to coursework reasonably straightforward.

6.2 Tasks

A number of AQA recommended tasks are included in the *Teachers' Coursework Guidance Pack*. Teachers may wish to choose a task and have all their candidates undertake it, or they may leave it up to individual candidates which task they choose to pursue.

Alternatively, teachers may wish to propose a different task. Where this is the case, they should submit the proposed alternative to their Coursework Adviser for approval **at least six weeks before** it is to be undertaken by candidates. The Coursework Adviser will consider whether the alternative task enables candidates to meet all the assessment criteria and will respond to centres accordingly.

6.3 Support from AQA

AQA provides the following support for centres.

Teachers' Coursework Guidance Pack

A *Teachers' Coursework Guidance Pack* is available for each unit, containing:

- a number of AQA recommended tasks;
- notes for students, to be given out by the teacher;
- notes for teachers; and
- exemplar materials showing how the marking criteria are to be applied.

Centres who advise AQA of their intention to enter using the *Estimated Entries Form* supplied to Examinations Officers will automatically be sent a *Teachers' Coursework Guidance Pack* the first time they enter. Where an *Estimated Entries Form* has not been completed, centres should telephone AQA for a copy of the appropriate pack.

Teachers' Standardisation Meetings

Free Teachers' Standardisation meetings run every Autumn Term for new centres or those who have had problems in the previous year, to include:

- feedback to centres on the moderation process;
- further guidance on the application of the marking criteria;
- marking exercises, written commentaries and further exemplar materials.

In the first year of the specification, all centres must attend one of these meetings before marking coursework.

Coursework Advisers

Coursework Advisers are available who can offer support and guidance on the marking criteria and can approve alternative tasks centres may wish to use. Teachers should contact the GCE Mathematics subject department (see Contact Points section) for details of their Coursework Adviser.

6.4 Key Skills

Undertaking coursework can develop candidates' Key Skills and generate evidence for their assessment. More details of the particular Key Skills which can be assessed for any unit will be included in the *Teachers' Coursework Guidance Packs* sent to centres. However, in attempting, for example, a piece of coursework in Mechanics or Statistics, a student may need to:

- Research information for assumptions made using either electronic sources such as the internet IT3.1 or from written materials C3.2.
- Discuss the tasks in groups in the initial stages, before writing up. C3.1a.
- Plan and collect relevant data and information ensuring that the sample size used is appropriate. N3.1.
- Ensure that an appropriate range of calculations is attempted and that answers are quoted to appropriate levels of accuracy. N3.2.

- Write up an extended document which may include charts, diagrams, spreadsheets, etc using a range of presentational techniques and media. C3.3, N3.3, IT3.3.
- Interpret their results and relate them back to the original task.
- Consider if any method of validation is available to check their results. This may include electronic methods such as e-mailing. IT3.1.
- Write coherently and effectively using accurate English skills. C3.3.

The piece(s) of coursework submitted by a candidate may provide a significant proportion of the evidence needed for success to be achieved in the Key Skills Qualification which, when linked to the other opportunities 'flagged up' in the *Teachers' Coursework Guidance Pack*, will enable teachers to approach Key Skills with confidence and high levels of support.

6.5 Administration

The list of key points below is only intended as a summary. Further details relating to the submission of coursework and marks are given in the booklet CAW/INST(GCE) available from your Examinations Officer. Further details of the moderation process are available in the specification.

- Candidates should not use pencil in their coursework, except in diagrams. Coursework may be written in dark ink or word processed.
- Candidates' coursework should have the pages numbered and should be fastened using staples or treasury tags in the top left hand corner. Please do not use plastic wallets or folders.
- Coursework must be annotated (in red pen) to show where marks have been awarded. Candidates' calculations must be checked and errors taken into account in the marking. Teachers' annotation is very helpful to the moderation process and helps enable moderators to endorse centres' marking.
- A Candidate Record Form must be completed for each candidate, with the declaration signed by the candidate to confirm the work is their own, and details given by the teacher of any additional assistance given. There are two marking grids included: the first is less detailed and its completion is mandatory; the other is more detailed and is optional. Completion of the marking grids greatly helps the moderation process.
- A Centre Declaration Sheet, to confirm that internal standardisation has taken place within the centre, must also be sent to the moderator, even when only one teacher marks coursework at the centre.
- Candidate Record Forms and Centre Declaration Sheets are available on the website www.aqa.org.uk.
- All centres should send the bottom two copies of their Centre Mark Sheet(s) to the moderator by the deadline.

- Centres with 20 or fewer candidates should also send all candidates' coursework to the moderator by the deadline. Centres with more than 20 candidates should wait until the moderator returns a copy of their Centre Mark Sheet indicating which candidates' work the centre needs to send.
- A deadline exists for receipt of the materials by the moderator – usually 15 May and 10 January for the summer and January examinations respectively. Where a particular issue arises which may lead to late submission, centres should request an extension to the coursework deadline in writing to AQA.

7 Language used in AQA Mathematics Question Papers

7.1 Introduction

AQA works to ensure that all questions are clear, accessible and unambiguous to all candidates; in particular that candidates, under examination conditions, are aware of what is required in their solutions. The following is intended as a guide to indicate what is meant when some commonly used phrasing is used in questions on AQA GCE Mathematics papers.

7.2 List of commonly used requests

These are common requests made of candidates, together with an explanation of their meaning.

'Show that', 'verify that' and 'prove that'	In each of these, an answer is given and candidates need to construct a logical argument that shows that the given information leads to the printed result. In particular, 'verify that' often indicates that using the printed result in the argument is recommended. 'Prove that' often indicates that the result is either a standard result for the specification or that a formal use of the methods of mathematical argument is being assessed, e.g. 'Prove by contradiction that…'.
'Deduce that'	This is identical to 'Show that' except that it specifically indicates that a previous result (or results) in the question is relevant.
'Find' and 'Determine'	This is identical to the requirements of 'show that' except that the answer is not given and any correct form for the answer is acceptable. However, candidates will usually be expected to simplify their answers, e.g. by cancelling fractions or collecting terms or using standard results within the specification (e.g. ln e =1).
'Work out' and 'Calculate'	This indicates that a calculation or calculations are required. The calculation which leads to the result obtained should be shown in the working.
'Explain'	A written explanation is required, although this can include, or be substantially, arithmetic, algebraic, diagrammatic or graphical work as appropriate.
'Practical'	Where a question asks for a practical interpretation, it specifically indicates that the answer should be phrased in the context of the question.
'Write down' and 'State'	Although the rubric to the papers state that all necessary working must be shown to indicate that a correct method has been used, in this case a correct answer with no working or explanation will gain full credit.
'Give a reason' and 'Give a value'	The reason or value does not need to be justified.
'Hence'	Use results found or given earlier in the question.
'Hence, or otherwise,'	Any method within the specification is acceptable, but results found or given earlier in the question could be useful.

It should also be noted that:

- where a result is given in a question, candidates can (and should whenever necessary) use this printed result in subsequent working, although they might not have obtained it themselves;
- exact results require exact calculations;
- where an answer is required to a specified degree of accuracy, calculations should use values to a greater degree of accuracy wherever possible.

8 Key dates

10 January 2005	Last date for submission of coursework marks for January 2005
21 January 2005 (Fri pm)	Date of examination for MPC1, MPC2
25 January 2005 (Tues am)	Date of examination for MD01
27 January 2005 (Thurs pm)	Date of examination for MS/SS1A/W, MS1B
31 January 2005 (Mon am)	Date of examination for MM1A/W, MM1B
1 February 2005 (Tues am)	Date of examination for MFP1
10 March 2005	Issue of January 2005 results by EDI
17 March 2005	Receipt by centres of hard copies of January 2005 results
21 March 2005	Last date for entries for Summer 2005
15 May 2005	Last date for submission of coursework marks for Summer 2005
7 June 2005 (Tues pm)	Date of examination for MPC1, MPC2
9 June 2005 (Thurs am)	Date of examination for MS/SS1A/W, MS/SS1B, MS2A/W, MS2B
16 June 2005 (Thu pm)	Date of examination for MM1A/W, MM1B, MM2A/W, MM2B
20 June 2005 (Mon am)	Date of examination for MD01, MD02
22 June 2005 (Wed pm)	Date of examination for MFP1, MFP4
24 June 2005 (Fri am)	Date of examination for MPC3, MPC4
28 June 2005 (Tues pm)	Date of examination for MM03
18 August 2005	Issue of Summer 2005 results

NB Examination dates are provisional and should be checked against the final version of the Timetable.

9 Finding the right questions in AQA past papers

9.1 Introduction

This section maps questions from AQA's past papers to the new specification content. For each unit the areas of content, as given in the specification, are listed on the left, with tables of relevant questions from past papers given on the right. The questions listed have all been taken from AQA's two legacy GCE Mathematics specifications: GCE Mathematics A and GCE Mathematics and Statistics B.

9.2 Core 1

Algebra

MAME	*Jan*	*Jun*	*Nov*
2001	Q1, Q2	Q3, Q4	
2002	Q3, Q4, Q5(c)	Q1, Q3, Q5	Q3, Q5
2003	Q3, Q8	Q2, Q6, Q8(a)(b)	Q2
2004	Q3, Q7	Q1, Q5	

MAP2	*Jan*	*Jun*
2001		Q4
2002		Q1
2003	Q1	

MBP1	*Jan*	*Jun*	*Nov*
2001	Q5	Q3, Q6, Q7 except c(ii)	
2002	Q2	Q3	Q2(a), Q5, Q8 except (a)
2003	Q1	Q1	Q1, Q6
2004	Q5	Q2, Q4, Q5(a)(b)	

MBP2	*Jan*	*Jun*	*Nov*
2003		Q1	

MBP3	*Jan*	*Jun*
2004		Q8(a)

Coordinate Geometry

MAME	*Jan*	*Jun*	*Nov*
2002	Q8		Q7
2003	Q5	Q4	Q4(c), Q7
2004	Q5	Q7	

MAP2	*Jan*	*Jun*
2001		Q3
2002	Q6	Q6
2003	Q3	Q6
2004	Q2	Q6 (not b(ii))

MBP1	*Jan*	*Jun*	*Nov*
2001	Q4	Q2	
2002	Q4	Q2	Q4
2003	Q2	Q2	Q3
2004	Q2	Q4(a)	

MBP4	*Jan*	*Jun*
2001		Q2(a)
2003	Q4 (not b(i))	
2004		Q5(a)

Differentiation

MAME	*Jan*	*Jun*	*Nov*
2001	Q5	Q6	
2002		Q7	Q8
2003	Q7	Q8	Q4
2004	Q8	Q6	

MBP1	*Jan*	*Jun*	*Nov*
2001		Q7	
2003		Q6 (not b(ii), c)	
2004		Q1	

MBP2	*Jan*	*Jun*	*Nov*
2002			Q4
2003		Q2	

Integration

MAME	*Jan*	*Jun*	*Nov*
2002	Q8	Q7	Q7
2003	Q7	Q8	Q7
2004	Q8	Q6	

MBP1	*Jan*	*Jun*	*Nov*
2003		Q6 (not b(ii), c)	

9.3 Core 2

Algebra and Functions

MAME	*Jan*	*Jun*	*Nov*
2003			Q5

Sequences and Series

MAP1	*Jan*	*Jun*	*Nov*
2001	Q5	Q1	
2002	Q3	Q2	Q2
2003	Q1	Q6	Q1, Q6
2004	Q2, Q4	Q1, Q5	

MAP2	*Jan*	*Jun*
2002		Q2

MAP3	*Jan*	*Jun*
2002	Q1	
2003		Q1

MBP1	*Jan*	*Jun*	*Nov*
2001	Q1	Q1(a)	
2002	Q1	Q1	Q1
2003	Q3		
2004	Q1		

MBP2	*Jan*	*Jun*	*Nov*
2001	Q5	Q6	
2002	Q1	Q3	Q3
2003	Q1	Q6	Q2
2004	Q6		

MBP4	*Jan*	*Jun*
2002	Q1	
2003		Q1

Trigonometry

MAP1	*Jan*	*Jun*	*Nov*
2001	Q3	Q4	
2002	Q5(b) (not v)	Q5, Q6	Q5
2003	Q4	Q3(a), Q4	Q3(a)(b), Q6
2004	Q3, Q7	Q2, Q6	

MAP2	*Jan*	*Jun*
2004		Q6

MBP1	*Jan*	*Jun*	*Nov*
2001	Q2	Q4	
2002		Q6	Q3
2003	Q5	Q5	Q5
2004	Q6	Q7	

MBP2	*Jan*	*Jun*	*Nov*
2001	Q4	Q8(b)	
2002	Q6	Q4, Q7 (not c(ii))	Q1, Q5
2003	Q3	Q5(a)	Q6
2004	Q2(a), Q4	Q4	

Exponentials and logarithms

MAP1	*Jan*	*Jun*	*Nov*
2002	Q2		Q4
2003			Q5
2004		Q4	

MBP1	*Jan*	*Jun*	*Nov*
2002		Q4	

MBP2	*Jan*	*Jun*	*Nov*
2001		Q5	
2002	Q4		
2003	Q5	Q6	Q3(a)(b)(c)

MBP4	*Jan*	*Jun*
2003	Q2(a)	

Differentiation

MAP1	*Jan*	*Jun*	*Nov*
2001	Q1	Q5	
2002	Q1		Q6
2003	Q6	Q2	Q2(a)
2004		Q3	

MBP1	*Jan*	*Jun*	*Nov*
2001	Q8(a) (b)(i)		
2002	Q7 (not b(iii))	Q5	
2003	Q6		Q4
2004	Q7		

MBP2	*Jan*	*Jun*	*Nov*
2002	Q6		

Integration

MAP1	*Jan*	*Jun*	*Nov*
2001	Q1		
2002	Q1		Q3(a)
2003	Q6	Q1	
2004	Q1		

MBP1	*Jan*	*Jun*	*Nov*
2002	Q3	Q5	Q6
2003	Q6		Q4
2004	Q7		

MBP5	*Jan*	*Jun*
2001		Q2
2002		Q2
2004	Q1	

9.4 Core 3

Algebra and Functions

MAP1	*Jan*	*Jun*	*Nov*
2001	Q4	Q7(a), Q8	
2002	Q4	Q7	Q7
2003	Q5, Q6	Q5	Q7 (not b)
2004	Q6	Q7(b)(c)	

MBP1	*Jan*	*Jun*	*Nov*
2001	Q6		
2002	Q5, Q6	Q7	Q7
2003	Q7	Q4 (not(a)), Q7	
2004	Q3 (not(a)), Q4	Q3	

MBP2	*Jan*	*Jun*	*Nov*
2001		Q4	
2002	Q2	Q6	
2003	Q4	Q5	
2004	Q5	Q7	

Trigonometry

MBP4	*Jan*	*Jun*
2002	Q6(b)	
2003		Q3

Exponentials and logarithms

MAP1	*Jan*	*Jun*	*Nov*
2001	Q2		

MBP2	*Jan*	*Jun*	*Nov*
2001		Q7	
2002			Q7
2004		Q5	

Differentiation

MAP1	*Jan*	*Jun*	*Nov*
2001	Q6	Q2, Q6	
2002	Q6 (not (c))	Q3, Q4	
2003	Q3		
2004	Q5		

MAP2	*Jan*	*Jun*
2001		Q1
2002	Q3	Q5
2003	Q7	Q5
2004	Q4	Q4

MBP1	*Jan*	*Jun*	*Nov*
2001		Q7	

MBP2	*Jan*	*Jun*	*Nov*
2001	Q2, Q7	Q3, Q7, Q8	
2002		Q5	Q7
2003	Q2, Q7	Q4	Q4, Q5
2004	Q3, Q7	Q5	

MBP4	*Jan*	*Jun*
2001		Q7, Q8
2002	Q8	Q2, Q7
2003		Q4
2004	Q7	Q1, Q7

MBP5	*Jan*	*Jun*
2001		Q5(a)

Integration

MAP1	*Jan*	*Jun*	*Nov*
2002	Q6 (not (c)	Q3, Q4	Q3
2003	Q6	Q4	
2004	Q5	Q7(a)	

MAP2	*Jan*	*Jun*
2001		Q8
2002	Q7	Q4, Q5
2003	Q2, Q7	Q1
2004	Q4, Q6 (not b(ii))	Q3

MBP2	*Jan*	*Jun*	*Nov*
2001	Q7	Q7	
2002		Q6	Q6
2003	Q7	Q4	Q5
2004	Q1	Q1, Q7	

MBP4	*Jan*	*Jun*
2001		Q8
2002	Q6(a), Q8	Q7
2003		Q4
2004	Q7	

MBP5	*Jan*	*Jun*
2001		Q6(a)
2002	Q2	
2003	Q5(a)	Q4(a)

Numerical Methods

MAP1	*Jan*	*Jun*	*Nov*
2001	Q2		
2002			Q1
2004	Q5	Q3(a)	

MAP2	*Jan*	*Jun*
2001		Q7 (not b(ii))
2003	Q5, Q7	
2004	Q6 (not b(ii))	Q5

MBP1	*Jan*	*Jun*	*Nov*
2001		Q7	
2002	Q5		
2004		Q3	

MBP2	*Jan*	*Jun*	*Nov*
2001	Q7	Q7	

MBP4	*Jan*	*Jun*
2004	Q5	

MBP5	*Jan*	*Jun*
2002	Q2	
2003	Q7(a)	Q2
2004		Q2

9.5 Core 4

Algebra and Functions

MAP2	*Jan*	*Jun*
2002	Q1	

MAP3	*Jan*	*Jun*
2001		Q7
2002		Q2
2003	Q3	
2004	Q4	Q3

MBP2	*Jan*	*Jun*	*Nov*
2001	Q1	Q1	
2002	Q5	Q2	Q2
2003	Q6		
2004	Q6	Q6(a)(b)(c)	

MBP4	*Jan*	*Jun*
2001		Q6
2002	Q2(a)	
2003	Q6	Q2
2004	Q3(b)	Q3

Coordinate Geometry in the (x, y) plane

MAP3	*Jan*	*Jun*
2002		Q3

Sequences and Series

MAP3	*Jan*	*Jun*
2001		Q7
2002		Q2
2003	Q1	
2004	Q4	Q2

MBP5	*Jan*	*Jun*
2001		Q8
2003		Q1
2004	Q3	Q1

Trigonometry

MAP2	*Jan*	*Jun*
2001		Q6
2002	Q4, Q5	Q8
2003	Q4	Q3
2004	Q3	Q2

MBP4	*Jan*	*Jun*
2002		Q4
2003	Q5, Q7	
2004	Q6	Q6

MBP5	*Jan*	*Jun*
2001		Q5
2002	Q1(a)	Q3(a)
2003	Q1(a)	Q7
2004	Q4(a)	Q3(a)

Exponentials and logarithms

MAP3	*Jan*	*Jun*
2002	Q4	Q4
2003		Q4
2004	Q3	

MBP4	*Jan*	*Jun*
2004		Q2

Differentiation and Integration

MAP3	*Jan*	*Jun*
2001		Q1, Q3
2002	Q2, Q7	Q1, Q3, Q5
2003	Q2, Q3, Q7	Q2
2004	Q1, Q6	Q1, Q3, Q4, Q7

MBP4	*Jan*	*Jun*
2001		Q6
2002	Q7	Q4, Q5
2003	Q6, Q7	Q6
2004	Q3(b)	Q3

MBP5	*Jan*	*Jun*
2001		Q5, Q6, Q7(a)(b)
2002	Q4	Q4, Q5(a)
2003	Q3, Q5	Q7
2004	Q2, Q6(a)	Q4

MBP7	*Jan*	*Jun*
2004		Q4

Vectors

MAP3	*Jan*	*Jun*
2001		Q6
2002		Q8 (not b(ii))
2004	Q7(a)(b)	Q8

MBP5	*Jan*	*Jun*
2001		Q1, Q4
2002		Q6(a)(b)(i)
2003		Q5

MBP7	*Jan*	*Jun*
2003		Q5

9.6 Further Pure 1

Algebra and Graphs

MAP2	*Jan*	*Jun*
2001		Q5
2002		Q3
2003		Q7(a)(b)

MAP3	*Jan*	*Jun*
2002		Q3(a)

MAP4	*Jan*	*Jun*
2004		Q1

MBP3	*Jan*	*Jun*
2001		Q6
2002	Q1, Q3	Q2
2003	Q1, Q3	
2004	Q2, Q3	Q2

MBP5	*Jan*	*Jun*
2001		Q3
2002		Q7
2003	Q2	Q3
2004	Q5	Q5

Complex Numbers

MAP4	*Jan*	*Jun*
2004	Q1(a)(b)	Q1

MBP3	*Jan*	*Jun*
2002		Q4(a)
2004	Q6(a)	

Roots and coefficients of a quadratic equation

MAP2	*Jan*	*Jun*
2001		Q2
2003		Q2
2004	Q1	

MAP4	*Jan*	*Jun*
2004		Q1

MBP3	*Jan*	*Jun*
2001		Q8
2002	Q9	Q1
2003	Q7	Q9
2004	Q1	Q3

Series

MBP1	*Jan*	*Jun*	*Nov*
2001		Q1(b)	
2003		Q3	
2004		Q6	

MBP3	*Jan*	*Jun*
2001		Q9(a)(ii)

Calculus

MBP1	*Jan*	*Jun*	*Nov*
2001	Q7		
2004		Q5(d)	

Numerical Methods

MAP1	*Jan*	*Jun*	*Nov*
2001		Q3	
2002	Q5(a)	Q1	
2003	Q2	Q3	Q3(a)(c)

MAP2	*Jan*	*Jun*
2001		Q7
2002		Q7
2003		Q4
2004	Q6(a)(b)	

MAP3	*Jan*	*Jun*
2001		Q5
2002	Q3	
2003	Q4	Q6(a)
2004	Q2	

MBP3	*Jan*	*Jun*
2001		Q5
2002	Q6	
2003	Q5	Q7
2004	Q5	Q6

MBP4	*Jan*	*Jun*
2002	Q2(b)	
2003	Q2	Q5(a)
2004		Q4(a)(b)

Trigonometry

There are no specific questions mapped to this section.

Matrices and Transformations

MAP6	*Jan*	*Jun*
2002	Q4	
2003	Q1	Q2

MBP3	*Jan*	*Jun*
2001		Q2
2002	Q2	
2003	Q2	

9.7 Further Pure 2

Roots of Polynomials

MAP4	*Jan*	*Jun*
2001		Q2
2002	Q6	Q1
2003	Q1	Q1
2004		Q4

MBP7	*Jan*	*Jun*
2002		Q1

Complex Numbers

MAP4	*Jan*	*Jun*
2001		Q4
2002	Q1	Q2, Q4, Q5
2003	Q2	Q3
2004	Q1	Q3

MBP3	*Jan*	*Jun*
2001		Q1
2002	Q4	Q4
2003	Q4	Q1
2004	Q6	Q4

MBP6	*Jan*	*Jun*
2002		Q1, Q5
2003		Q1

MBP7	*Jan*	*Jun*
2002		Q2
2003		Q1
2004		Q7

De Moivre's Theorem

MAP4	*Jan*	*Jun*
2001		Q6, Q7
2002	Q1, Q3	
2003	Q6	Q6
2004	Q2, Q6	Q5

MBP6	*Jan*	*Jun*
2002	Q5	Q1
2003	Q2	Q8
2004	Q6	Q2, Q5

Proof by Induction

MAP4	*Jan*	*Jun*
2001		Q3
2002	Q2	Q6
2003	Q5	
2004	Q3	

MBP3	*Jan*	*Jun*
2001		Q9
2002	Q5	Q9
2003		Q4
2004	Q9	Q7

MBP6	*Jan*	*Jun*
2004		Q5(a)

Finite Series

MAP4	*Jan*	*Jun*
2003	Q3	Q5
2004		Q2

MBP3	*Jan*	*Jun*
2001		Q9
2002		Q9
2003	Q9	
2004	Q9	

Hyperbolic Functions

MAP4	*Jan*	*Jun*
2001		Q1
2002	Q4	Q7
2003	Q4	Q2, Q4
2004	Q4	Q6

MBP6	*Jan*	*Jun*
2002	Q9 (not d (ii))	Q3
2003	Q1, Q8(a)	Q7
2004	Q8	Q1, Q8

Arc length and Area of surface of revolution about the x-axis

MAP4	*Jan*	*Jun*
2001		Q5
2002	Q5	Q3
2003		Q4
2004	Q5	Q6

MBP6	*Jan*	*Jun*
2003	Q7	
2004		Q8

9.8 Further Pure 3

Series and Limits

MAP3	*Jan*	*Jun*
2001		Q4
2002		Q6
2003	Q5	Q5
2004	Q5	Q6

MAP5	*Jan*	*Jun*
2001		Q1, Q5
2002	Q1, Q4	Q4, Q7
2003	Q1, Q3	Q2, Q3
2004	Q2, Q4	Q1, Q2

Polar Coordinates

MAP5	*Jan*	*Jun*
2001		Q3, Q4
2002	Q5	Q1, Q3
2003	Q2	Q6
2004	Q3	Q4, Q6

MBP3	*Jan*	*Jun*
2001		Q7
2002	Q10	Q6
2003	Q8	Q6
2004	Q8	Q8(b)(c)

MBP7	*Jan*	*Jun*
2004		Q1, Q3

Differential Equations

MAP5	*Jan*	*Jun*
2002	Q2	

Differential Equations – First Order

MAP5	*Jan*	*Jun*
2001		Q6
2002		Q2
2003	Q4, Q6	Q1
2004	Q6	Q3, Q5

MBP6	*Jan*	*Jun*
2003		Q2

Differential Equations – Second Order

MAP5	*Jan*	*Jun*
2001		Q2
2002	Q6	Q5
2003	Q4, Q5	Q5
2004	Q5	Q7

MBP6	*Jan*	*Jun*
2002	Q3	Q7
2003	Q6	Q5
2004	Q3	Q3

9.9 Further Pure 4

Vectors and Three-Dimensional Coordinate Geometry

MAP3	*Jan*	*Jun*
2001		Q6
2002	Q8	Q8
2003	Q8	Q7
2004	Q7	

MAP6	*Jan*	*Jun*
2001		Q1, Q3, Q6
2002	Q2, Q7	Q1, Q4, Q5
2003	Q3, Q7	Q5, Q6
2004	Q1, Q4	Q1, Q4

MBP5	*Jan*	*Jun*
2002	Q3	
2003	Q6	
2004	Q7	Q6

MBP7	*Jan*	*Jun*
2004		Q2, Q6

Matrix Algebra

MAP6	*Jan*	*Jun*
2001		Q2, Q4, Q7
2002	Q1, Q4, Q5, Q6	Q2, Q3, Q6, Q7
2003	Q2, Q4	Q1, Q2, Q3, Q4
2004	Q3, Q5, Q6	Q2, Q5

MBP3	*Jan*	*Jun*
2002		Q3
2003		Q2
2004		Q1, Q5

MBP6	*Jan*	*Jun*
2002	Q1	Q6
2003	Q4	Q4
2004	Q5	Q6

Solution of Linear Equations

MAP6	*Jan*	*Jun*
2001		Q5
2002	Q3	Q6
2003	Q6	Q3
2004		Q3

MBP7	*Jan*	*Jun*
2002		Q4
2003		Q7

Determinants

MAP6	*Jan*	*Jun*
2003	Q5	Q3
2004	Q2	Q3(a)

MBP3	*Jan*	*Jun*
2002		Q3
2003		Q2
2004	Q4	

MBP6	*Jan*	*Jun*
2003	Q4	

MBP7	*Jan*	*Jun*
2003		Q2

Linear Independence

MAP6	*Jan*	*Jun*
2001		Q1
2004	Q2	

9.10 Statistics 1

Numerical Measures

MAME	*Jan*	*Jun*	*Nov*
2001	Q6	Q2(a), Q7	
2002	Q5(a)(b), Q7	Q6, Q8	Q2, Q6
2003	Q6	Q3(b), Q7	Q3, Q6
2004	Q4	Q3, Q8	

MBS1	*Jan*	*Jun*	*Nov*
2001		Q5(a)	
2002			Q3(c)
2003	Q3(b)(i)		
2004		Q2(a)	

Probability

MAME	*Jan*	*Jun*	*Nov*
2001	Q7	Q5	
2002	Q6	Q4	Q4
2003	Q4	Q5	
2004	Q6	Q4	

MBS1	*Jan*	*Jun*	*Nov*
2001	Q5	Q4	
2002	Q5	Q7	Q7
2003	Q6	Q3	Q7
2004	Q7	Q5	

MBS3	*Jan*	*Jun*
2001		Q2
2002	Q2	Q1
2003	Q1	Q1
2004	Q2	Q3

MBS5	*Jan*	*Jun*
2001		Q2
2002	Q1	Q4
2003	Q6	Q4
2004	Q4	Q5

MBS6	*Jan*	*Jun*
2001		Q2
2002	Q1	Q1
2003	Q2	Q1
2004	Q2	Q3

Binomial Distribution

MAS1	*Jan*	*Jun*	*Nov*
2001		Q6(a)(b)(d)	
2002	Q6(a)(b)	Q3	Q6(a)(b)
2003	Q5(a)	Q2(a)(b)	Q1(b), Q3(a)
2004	Q2(a)(b)	Q3	

MBS1	*Jan*	*Jun*	*Nov*
2001		Q3	
2002	Q1	Q6	Q2
2003	Q5	Q1	Q6
2004	Q6	Q7	

Normal Distribution

MAS1	*Jan*	*Jun*	*Nov*
2001		Q4(a) (b)	
2002	Q7	Q7(a)	Q1
2003	Q3	Q6	Q1(a)
2004	Q4(a)	Q1	

MBS1	*Jan*	*Jun*	*Nov*
2001	Q2, Q7(a)–(d)	Q6	
2002	Q8	Q4	Q1, Q6
2003	Q7	Q8	Q5
2004	Q5	Q4	

MBS5	*Jan*	*Jun*
2001		Q5
2002	Q2	Q5
2003	Q4	Q3
2004	Q1	Q6

Estimation

MAS1	*Jan*	*Jun*	*Nov*
2001		Q4(c)	
2002	Q2	Q7(b)	Q3
2003	Q1	Q5	Q7
2004	Q4(b)	Q5	

MBS4	*Jan*	*Jun*
2002	Q1, Q5(c)	Q2
2003	Q6(b)(c)	
2004	Q2(a)(b)	Q3(b)(c)

MBS5	*Jan*	*Jun*
2001		Q3
2002	Q4	Q2(a)
2003	Q3	Q6
2004	Q2(a)(b)	Q4

MBS7	*Jan*	*Jun*
2004		Q1(b)

Correlation and Regression

MAS4	*Jan*	*Jun*
2002	Q2(a), Q5	Q3(a), Q6
2003	Q5(a)	Q1
2004	Q1	Q2(a), Q4

MBS1	*Jan*	*Jun*	*Nov*
2001	Q1, Q6	Q2, Q7	
2002	Q2, Q7	Q2, Q8	Q8
2003	Q2, Q8	Q7	Q1, Q8
2004	Q2, Q8	Q6	

MBS5	*Jan*	*Jun*
2001		Q1, Q6
2002	Q3	Q1, Q3
2003	Q1, Q2	Q1, Q2
2004	Q5	Q1, Q3

9.11 Statistics 2

Discrete Random Variables

MAME	*Jan*	*Jun*	*Nov*
2001	Q4	Q1	
2002	Q2	Q2	Q1
2003	Q1	Q1	Q1
2004	Q1	Q2	

MAS1	*Jan*	*Jun*	*Nov*
2001		Q5	
2002	Q3	Q5	Q4
2003	Q2	Q7	Q6
2004	Q5	Q6	

MBS4	*Jan*	*Jun*
2002	Q3	Q1
2003	Q2	Q2
2004	Q5	Q1

Poisson Distribution

MAS2	*Jan*	*Jun*
2001		Q7(a)
2002	Q4	Q1(a)
2003	Q2	
2004		Q1

MBS1	*Jan*	*Jun*	*Nov*
2001	Q4	Q1	
2002	Q6	Q1	Q4
2003	Q1	Q5	Q3
2004	Q1	Q1	

MBS2	*Jan*	*Jun*
2003		Q2(a)(b)(c)

MBS4	*Jan*	*Jun*
2001		Q1

Continuous Random Variables

MAS1	*Jan*	*Jun*	*Nov*
2001		Q2, Q3	
2002	Q1, Q5	Q4, Q6	Q5, Q7
2003	Q4, Q6	Q1, Q3	Q2, Q4
2004	Q1, Q5	Q2, Q4	

MAS2	*Jan*	*Jun*
2001		Q3
2002	Q3	Q3
2003	Q3	Q3
2004	Q3	Q4

MBS4	*Jan*	*Jun*
2001		Q3
2002	Q4	Q3
2003	Q4	Q3
2004	Q3	Q4

Estimation

MAS3	*Jan*	*Jun*
2002	Q3(a)	Q3
2003	Q3	Q4(a)(b)
2004		Q1(a)(b)(c)(i)

MBS4	*Jan*	*Jun*
2002	Q5(a)(b)	
2003	Q6(a)	Q4
2004		Q3(a)

Hypothesis Testing

MAS2	*Jan*	*Jun*
2001		Q5
2002		Q6(a)(b)(c)(i)
2003	Q6(a)(b)(c)	
2004		Q5(a)(b)

MAS3	*Jan*	*Jun*
2002		Q5(a)
2004	Q5(a)	

MBS4	*Jan*	*Jun*
2001		Q5
2002	Q6	Q5
2003	Q1, Q5	Q5
2004	Q4	Q2

MBS5	*Jan*	*Jun*
2001		Q4
2002	Q5	Q6
2003	Q5	Q5
2004	Q3	Q2

Chi – Squared (x^2) Contingency Table Tests

MAS2	*Jan*	*Jun*
2002	Q2	Q4
2003	Q4	
2004	Q5	

MBS4	*Jan*	*Jun*
2001		Q4
2002	Q2	Q4
2003	Q3	Q1
2004	Q1	Q5

9.12 Statistics 3

Further Probability

There are no specific questions mapped to this section.

Linear Combinations of Random Variables

MAS2	*Jan*	*Jun*
2001		Q1, Q4
2002	Q5	Q5
2003	Q5	Q6
2004	Q6	Q6

MBS2	*Jan*	*Jun*
2004	Q5	

MBS7	*Jan*	*Jun*
2002	Q4	Q2
2003	Q5	Q6
2004	Q5	

Distributional Approximations

MAS1	*Jan*	*Jun*	*Nov*
2001		Q6(c)	
2002	Q6(c)	Q1	Q6(c)
2003	Q5(b)	Q2(c)	Q3(b)
2004	Q2(c)		

MAS2	*Jan*	*Jun*
2001		Q6
2002	Q1, Q6(a)	Q1(b)
2003	Q1	Q1
2004	Q2	Q3

MBS2	*Jan*	*Jun*
2001		Q2
2002	Q1	Q2
2003	Q3	Q2(d)
2004		Q5

Estimation

MAS3	*Jan*	*Jun*
2002	Q1	
2003		Q2

MAS4	*Jan*	*Jun*
2002	Q4(a),Q6(b)	Q2, Q5(a)
2003	Q7	Q5
2004	Q4, Q6(a)	Q3, Q5(b)

MBS2	*Jan*	*Jun*
2001		Q4
2002	Q3	Q4
2003	Q2	Q3
2004	Q4	Q1

MBS4	*Jan*	*Jun*
2004	Q2(c)	

MBS5	*Jan*	*Jun*
2002		Q2(b)(c)(d)
2004	Q2(c)	

Hypothesis Testing

MAS2	*Jan*	*Jun*
2002	Q6(b)(c)	Q6(c)(ii)
2003	Q6(d)	Q4
2004	Q4	Q5(c)(ii)

MAS3	*Jan*	*Jun*
2002		Q5(b)

MAS4	*Jan*	*Jun*
2002	Q2(b), Q4(b), Q6(a)	Q3(b), Q5(b)
2003	Q1, Q3, Q5(b)	Q2, Q4
2004	Q2, Q6(b)	Q2(b)(c), Q5(a)

MBS3	*Jan*	*Jun*
2002		Q3(a)(b)
2003		Q4(b)(i)
2004		Q1

MBS6	*Jan*	*Jun*
2001		Q1(d)(e)
2002	Q2, Q3(a)(b)(c)	Q3(a)(b)
2003		Q4(b)
2004		Q1

MBS7	*Jan*	*Jun*
2002	Q3	Q4, Q6
2003	Q3, Q6	Q3
2004	Q6	

9.13 Statistics 4

Geometric and Exponential Distributions

MAS2	*Jan*	*Jun*
2001		Q2
2002		Q2
2003		Q2
2004	Q1	

MAS3	*Jan*	*June*
2002	Q2	Q1
2003	Q2	Q1
2004	Q4	Q3

MBS7	*Jan*	*June*
2002	Q2	
2003	Q4	
2004	Q2	Q2

Estimators

MAS4	*Jan*	*June*
2002	Q3	Q4
2003	Q6	Q7
2004	Q7	Q6

Estimation

MAS3	*Jan*	*June*
2002	Q3(b)	Q4(a)
2003	Q5(b)	Q4(c)
2004	Q2, Q5(b)	Q1(c)(ii)(d), Q4(a)

MBS7	*Jan*	*June*
2002	Q1	
2003	Q1	Q1
2004	Q1	

Hypothesis Testing

MAS3	*Jan*	*June*
2002	Q4(a)(b), Q5	Q4(b)
2003	Q1, Q4(b), Q5(a)	Q5
2004	Q1	Q4(b)

MBS7	*Jan*	*June*
2002	Q5	Q1
2003		Q2
2004	Q7	Q1(a), Q3

MBS8	*Jan*	*June*
2002		Q5(a)(c)(d)
2003		Q4(b)
2004		Q2

Chi – Squared (x^2) Goodness of Fit Tests

MAS2	*Jan*	*June*
2001		Q7(b)
2003		Q5
2004		Q2

MBS7	*Jan*	*June*
2002		Q5
2003	Q2	Q5
2004	Q4	Q5

9.14 Mechanics 1

Mathematical Modelling

There are no specific questions mapped to this section.

Kinematics in One and Two Dimensions

MAM1	*Jan*	*Jun*	*Nov*
2001		Q1, Q2, Q4	
2002	Q2	Q1, Q6	Q1, Q2
2003	Q2, Q3	Q1, Q2, Q3	Q2, Q6
2004	Q3		

MBM1	*Jan*	*Jun*	*Nov*
2001	Q2, Q5	Q1, Q2,Q7	
2002	Q3, Q7	Q3, Q8	Q1, Q2, Q7
2003	Q1, Q8	Q1, Q8	Q1, Q2, Q8
2004	Q1, Q8		

MBM3	*Jan*	*Jun*
2002	Q1, Q2	
2003	Q1, Q3	Q1
2004	Q1, Q5	

Statics and Forces

MAM1	*Jan*	*Jun*	*Nov*
2002	Q3, Q4		
2003	Q5	Q1	
2004	Q1, Q2		

MBM1	*Jan*	*Jun*	*Nov*
2002		Q1	
2003	Q3	Q4	Q4
2004	Q5 (not d)		

Momentum

MAM1	*Jan*	*Jun*	*Nov*
2002	Q1	Q2	Q3
2003	Q1	Q5	Q5

MBM1	*Jan*	*Jun*	*Nov*
2001	Q7	Q6	
2002	Q2	Q2	Q5
2003	Q2	Q5	Q3
2004	Q2		

Newton's Laws of Motion

MAM1	*Jan*	*Jun*	*Nov*
2001		Q7	
2002			Q6
2003			Q3

MBM1	*Jan*	*Jun*	*Nov*
2001		Q3	
2002	Q6	Q7	Q8
2003	Q5	Q2	
2004	Q3		

MBM3	*Jan*	*Jun*
2002	Q5	Q2,Q4
2003	Q5	Q4
2004	Q2	

Connected Particles

MAM1	*Jan*	*Jun*	*Nov*
2001		Q3	
2002	Q5	Q5	Q5
2003	Q4	Q6	Q4
2004	Q6		

MBM1	*Jan*	*Jun*	*Nov*
2001	Q3	Q4	
2002	Q8	Q5	Q3
2003	Q4	Q6	Q7
2004	Q4		

Projectiles

MAM1	*Jan*	*Jun*	*Nov*
2001		Q6	
2002	Q7	Q4	Q4
2003		Q7	

MBM1	*Jan*	*Jun*	*Nov*
2001	Q4	Q5	
2002		Q4	Q6
2003			Q6
2004	Q7		

9.15 Mechanics 2

Mathematical Modelling

There are no specific questions mapped to this section.

Moments and Centres of Mass

MAM2	*Jan*	*Jun*
2001		Q3
2002	Q3	Q1
2003	Q2	Q2
2004	Q4	

MAM3	*Jan*	*Jun*
2002	Q2	Q1,Q2
2003	Q2	Q2
2004	Q2	

MBM1	*Jan*	*Jun*	*Nov*
2001	Q1,Q6	Q8	
2002	Q1,Q5	Q6	Q4
2003	Q6	Q3	Q5
2004	Q6		

Kinematics

MAM1	*Jan*	*Jun*	*Nov*
2003	Q6	Q4	

MBM2	*Jan*	*Jun*
2001		Q5
2002	Q5	Q1
2003		Q4

MBM3	*Jan*	*Jun*
2002	Q7	Q1
2003		Q7

Newton's Laws of Motion

MAM1	*Jan*	*Jun*	*Nov*
2002	Q6(omit b)	Q7	Q7
2003			Q1
2004	Q4, Q5(omit b)		

MBM2	*Jan*	*Jun*
2003	Q1, Q4	Q1
2004	Q2, Q5	

MBM3	*Jan*	*Jun*
2002		Q6
2003	Q2, Q7	Q2, Q3
2004	Q4, Q8	

MAM4	*Jan*	*Jun*
2002		Q1

Application of Differential Equations

MBM2	*Jan*	*Jun*
2001		Q8
2002		Q8
2003	Q8	Q8

MBM4	*Jan*	*Jun*
2004	Q1	

Uniform Circular Motion

MAM2	*Jan*	*Jun*
2001		Q4
2002		Q2
2003	Q5	Q1
2004	Q2	

MBM2	*Jan*	*Jun*
2002	Q1, Q6	Q2, Q5
2003	Q6	Q6
2004	Q3	

MBM3	*Jan*	*Jun*
2002	Q8	Q3, Q7
2003	Q8	Q8
2004	Q6	

Work and Energy

MAM2	*Jan*	*Jun*
2001		Q1, Q2
2002	Q2	Q3
2003		Q4
2004	Q3	

MBM2	*Jan*	*Jun*
2001		Q2, Q4
2002	Q2, Q3	Q3, Q6
2003	Q2, Q3	Q2, Q3
2004	Q1, Q4	

MBM3	*Jan*	*Jun*
2002	Q3, Q4	Q5, Q8
2003	Q4, Q6	Q5, Q6
2004	Q3, Q7	

Vertical Circular Motion

MAM2	*Jan*	*Jun*
2001		Q7
2002	Q7	Q6
2003	Q6	Q6
2004	Q5	

MBM5	*Jan*	*Jun*
2002	Q4	Q3
2003	Q3	Q1
2004	Q3	

9.16 Mechanics 3

Relative Motion

MBM4	*Jan*	*Jun*
2001		Q2
2002	Q5	Q3
2003	Q4	Q2
2004	Q7	

Dimensional Analysis

MBM4	*Jan*	*Jun*
2001		Q3
2002	Q4	Q2
2003	Q3	
2004	Q2	

Collisions in one dimension

MAM2	*Jan*	*Jun*
2001		Q6
2002	Q4	Q4
2003	Q4	Q3
2004	Q1, Q6	

MBM4	*Jan*	*Jun*
2001		Q4
2002	Q3	Q1
2003	Q1	Q5
2004	Q1	

MBM5	*Jan*	*Jun*
2002	Q3	
2004	Q1	

Collisions in two dimensions

MBM4	*Jan*	*Jun*
2001		Q6
2002	Q7	Q5
2003	Q5	
2004	Q4	

Further Projectiles

MAM1	*Jan*	*Jun*	*Nov*
2003	Q7	Q7	
2004	Q7		

MBM1	*Jan*	*Jun*	*Nov*
2002	Q4		
2003	Q7		Q7

Projectiles on Inclined Planes

MBM5	*Jan*	*Jun*
2002	Q5	Q4
2003	Q5	Q6
2004	Q4	

9.17 Mechanics 4

Moments

MAM3	*Jan*	*Jun*
2002	Q3	Q4
2003		Q4, Q5
2004	Q4, Q5	

MBM4	*Jan*	*Jun*
2001		Q1, Q7
2002	Q1, Q6	Q6
2003	Q2	Q3, Q4
2004	Q3, Q6	

Frameworks

MAM3	*Jan*	*Jun*
2002	Q5	Q3
2003	Q4	

MBM4	*Jan*	*Jun*
2001		Q5
2002	Q2	Q4
2003	Q6	Q1
2004	Q5	

Vector Products and Moments

MBM5	*Jan*	*Jun*
2002	Q2	Q2
2003	Q1	

Centres of Mass by Integration for Uniform Bodies

MAM3	*Jan*	*Jun*
2002		Q5
2003	Q5	

MBM2	*Jan*	*Jun*
2001		Q3
2002	Q4	Q4
2003	Q5	Q5
2004	Q6	

Moments of Inertia

MAM3	*Jan*	*Jun*
2002	Q6	Q6
2004	Q3	

MBM6	*Jan*	*Jun*
2002		Q2
2003		Q2

Motion of a Rigid Body about a Fixed Axis

MAM3	*Jan*	*Jun*
2002	Q1, Q4	Q2
2003	Q1, Q3, Q6	Q1, Q3, Q6
2004	Q1, Q6	

MBM6	*Jan*	*Jun*
2002		Q1, Q4
2003		Q4, Q5

9.18 Mechanics 5

Simple Harmonic Motion

MBM2	*Jan*	*Jun*
2001		Q1,Q7
2002	Q7	Q7
2003	Q7	Q7
2004	Q7	

Forced and Damped Harmonic Motion

MAM4	*Jan*	*Jun*
2002		Q4
2003	Q4	Q5
2004	Q3	

MBM5	*Jan*	*Jun*
2002	Q6	Q5
2003	Q4	Q4
2004	Q6	

Stability

MBM6	*Jan*	*Jun*
2002		Q5
2003		Q3

Variable Mass Problems

MAM4	*Jan*	*Jun*
2002	Q4	Q5
2003	Q2	Q3
2004	Q4	

MBM5	*Jan*	*Jun*
2002	Q7	Q6
2003		Q5
2004	Q5	

Motion in a Plane using Polar Coordinates

MAM4	*Jan*	*Jun*
2002	Q5	Q2
2003	Q3	
2004	Q5	

MBM6	*Jan*	*Jun*
2002		Q3
2003		Q1

9.19 Decision 1

Simple Ideas of Algorithms

MAD1	*Jan*	*Jun*	*Nov*
2001	Q1	Q1, Q3	
2002	Q5	Q1	Q3
2003	Q1, Q4		Q1
2004	Q3	Q2	

Graphs and Networks

MAD1	*Jan*	*Jun*	*Nov*
2001		Q4	
2002	Q1(a), Q3(a)		
2003	Q2	Q1(a)	
2004	Q5		

MBD1	*Jan*	*Jun*	*Nov*
2001	Q3(a)(b)(c)	Q3	
2002	Q3 (not last part) and Q5	Q2	Q1
2003	Q3(a), Q6(a)	Q7(a)(b)	Q7(a)(i)(b)(i)
2004	Q7(a)(b)(d)(e)	Q2	

Spanning Tree Problems

MAD1	*Jan*	*Jun*	*Nov*
2001	Q5(a)	Q2	
2002	Q2(b) (within TSP)	Q3(a)	Q2(a)
2003		Q2, Q5(a)	Q5(a)
2004	Q4 (with TSP)	Q4(a)	

MBD1	*Jan*	*Jun*	*Nov*
2001	Q4	Q2(c)	
2002	Q4	Q7	Q3
2003	Q1(c)(d)	Q2	Q1
2004	Q3	Q(b)(c)	

Matchings

MAD1	*Jan*	*Jun*	*Nov*
2001	Q2		
2002	Q1(b)	Q2	Q4(a)
2003		Q1(b)	Q2
2004	Q1	Q1	

Shortest Paths in Networks

MAD1	*Jan*	*Jun*	*Nov*
2001	Q3	Q5(d)	
2002	Q6	Q4(a)	Q5
2003	Q5(c)	Q3	Q5(b)
2004	Q6	Q5	

MBD1	*Jan*	*Jun*	*Nov*
2001	Q1	Q2(a)(b)	
2002	Q2	Q4	Q5
2003	Q1(a)(b)	Q4	Q3
2004	Q2	Q3(a)	

Route Inspection Problem

MAD1	*Jan*	*Jun*	*Nov*
2001	Q4	Q5(a)(b)(c)	
2002	Q3(b)	Q4(b)	Q2(b)
2003	Q5(a)(b)	Q5(b)	Q6
2004	Q2	Q4(b)	

MBD2	*Jan*	*Jun*
2002		Q3(a)
2003	Q1(a)	Q3(a)
2004	Q3(a)	Q1(b)

Travelling Salesperson Problem

MAD1	*Jan*	*Jun*	*Nov*
2001	Q5(b)(c)	Q6	
2002	Q2(b)(c)	Q3(b), Q6(b)(c)	Q4(b)
2003	Q6	Q6	Q4
2004	Q4	Q3	

MBD2	*Jan*	*Jun*
2002	Q2	Q2
2003	Q1(b)	Q3 (b)(c)(d)
2004	Q3(b)(c)	Q1(a)

Linear Programming

MAD1	*Jan*	*Jun*	*Nov*
2001	Q6	Q7	
2002	Q4	Q5	Q1, Q6
2003	Q3	Q4	Q3
2004	Q7	Q6	

MBD1	*Jan*	*Jun*	*Nov*
2001	Q6	Q7	
2002	Q8	Q5	Q6
2003	Q7	Q6	Q5
2004	Q6	Q5	

MBD2	*Jan*	*Jun*
2003	Q3	Q3(c)

Mathematical modelling

MAD1	*Jan*	*Jun*	*Nov*
2001	Q3, Q6	Q5, Q6, Q7	
2002	Q2, Q6	Q5, Q6	Q5, Q6
2003	Q3, Q6	Q3, Q4, Q5	Q5, Q6
2004	Q4(c), Q6, Q7	Q1, Q3, Q6	

MBD1	*Jan*	*Jun*	*Nov*
2001	Q4, Q6	Q2, Q7	
2002	Q2, Q4, Q8	Q4, Q5, Q7	Q1, Q3, Q5, Q6
2003	Q2, Q4, Q6	Q2, Q4, Q6	Q1, Q3, Q5
2004	Q2, Q3, Q5	Q3, Q5	

MBD2	*Jan*	*Jun*
2002		Q2
2003	Q1, Q3	Q3
2004	Q3	Q1

9.20 Decision 2

Critical Path Analysis

MAD2	*Jan*	*Jun*
2001		Q2
2002	Q3	Q6
2003	Q1	Q2
2004	Q2	Q3

MBD1	*Jan*	*Jun*	*Nov*
2001	Q5	Q6	
2002	Q7	Q6	Q4
2003	Q5	Q5	Q6
2004	Q5	Q6	

Allocation

MAD2	*Jan*	*Jun*
2001		Q1
2002	Q1	Q1
2003	Q2	Q1
2004	Q1	Q2

Dynamic Programming

MAD2	*Jan*	*Jun*
2001		Q4
2002	Q2	Q3
2003	Q4	Q6
2004	Q3	Q1

Network Flows

MAD2	*Jan*	*Jun*
2001		Q5
2002	Q4	Q5
2003	Q3	Q4
2004	Q4	Q4

MBD2	*Jan*	*Jun*
2001		Q1
2002		Q5
2003	Q4	Q4(a)
2004	Q4	Q6

Linear Programming

MAD2	*Jan*	*Jun*
2001		Q6
2002	Q5	Q4
2003	Q5(c)(i)(ii)	Q3
2004	Q5	Q5

MBD2	*Jan*	*Jun*
2001		Q8
2002		Q7
2003	Q8	Q6
2004	Q7	Q4

Game Theory for Zero Sum Games

MAD2	*Jan*	*Jun*
2001		Q3
2002	Q6	Q2
2003	Q5(a)(b)(c)(iii)(d)	Q5
2004	Q6	Q6

Mathematical Modelling

MAD2	*Jan*	*Jun*
2001		Q2, Q4
2002	Q2, Q3	Q3, Q6
2003	Q2, Q4	Q2, Q4
2004	Q2, Q4	Q1, Q2, Q3

MBD1	*Jan*	*Jun*	*Nov*
2001	Q5	Q6	
2002	Q7	Q6	Q4
2003	Q5	Q5	Q6
2004	Q5	Q6	

MBD2	*Jan*	*Jun*
2002		Q5, Q7
2004	Q7	Q6

Organisation of the Course

10 Delivery of the course

10.1 Introduction

This section highlights teaching schemes for AS and A2, intended to help teachers plan and implement the teaching of the new AQA GCE Mathematics specification. The purpose of these outline schemes is to provide advice and guidance to teachers, not to prescribe and restrict their approach to the specification. Each scheme has been produced by a practising GCE Maths teacher. There are obviously many other ways of organising the work, and there is absolutely no requirement to use these schemes.

10.2 General

It is important to expose the students to the style and standard of questions that they will meet in the examination. It would be beneficial to give candidates a selection of questions that have been set in previous AQA Specification A and B examinations to consolidate topics that have been taught (see the *Finding the Right Questions in AQA past papers* section).

The use of mathematical software packages should be encouraged both as a teaching tool and for students to consolidate their understanding of the concepts. "Autograph" is an ideal software package for graphs and differentiation.

For those candidates who studied for Intermediate Tier at GCSE, it would be advantageous to run booster classes as and when required in order to consolidate the areas of algebraic manipulation. Time spent in this area during the first term could eliminate difficulties in the spring and subsequent terms. Re-enforcement work on basic skills is available on internet sites e.g. AS Guru.

10.3 Scheme 1 (for A level Maths with 2 teachers)

It is assumed that there is a total of 4 – 4.5 hours per week of contact time and around 36 weeks in the academic year available for teaching. It is also assumed that there is some teaching time after the AS exams in Y12, though it is acknowledged that not all centres have this luxury. This scheme assumes equal contact time for the two teachers.

Date	**Teacher A**	**Teacher B**	**Notes**
Autumn Term Year 12 First half term	**Core 1** Algebraic manipulation of polynomials (12.1) Factorisation of quadratic polynomials (12.1) Completing the square (12.1) Solution of quadratic equations (12.1)	**Core 1** Surds (12.1) Algebraic division (12.1) Eqn of a straight line (12.2) Graphs of linear functions (12.1) Parallel and perpendicular lines (12.2)	Surds: At the start of the course focus on questions of the type illustrated in the first two examples only.

Autumn Term (cont'd)	Graphs of quadratic functions (12.1) Effect of translations on quadratic graphs (12.1) Discriminant of quadratic function (12.1) Linear and quadratic inequalities (12.1) Simultaneous equations (12.1)	Co-ordinate geometry of the circle (12.2) Eqn of a circle (12.2) Effect of translations on circles (12.1) Eqn of the tangent and normal (12.2) Geometrical interpretation of algebraic solutions (12.1) Intersection of a straight line and a curve (12.2)	
Second half term	Remainder theorem (12.1) Factor theorem (12.1) Graphs of quadratic and cubic functions (12.1) Geometrical interpretation of solutions of eqns (12.1) Factorisation of quadratics (12.1) Integration (12.4) Surds (12.1)	Differentiation (12.3) Start on Applied Maths module **(Statistics 1, Mechanics 1, Decision 1)**	Surds: Examples of the type in example 3.
Spring Term	Revision for MPC1 exam in January **Core 2** Sine and cosine rules (13.3) Area of a triangle (13.3) Degree and radian measure (13.3) Arc length, area of sector (13.3) Sequences and series (13.2) Laws of indices (13.1) $y = a^x$ and its graph (13.4) Logs, and laws of logs (13.4) Solution of eqns of form $a^x = b$ (13.4) Sine, cosine and tangent functions (13.3) Use of $\tan\theta = \frac{\sin\theta}{\cos\theta}$, $\sin^2\theta + \cos^2\theta = 1$ (13.3) Solution of trig eqns (13.3) Effect of transformations on the graph of $y = f(x)$ (13.1) Differentiation (13.5) Integration (13.6)	Revision for MPC1 exam in January Continue with Applied Maths module	January: Students sit MPC1 (if centre policy allows). Make full use of past questions from AQA Specifications A and B papers in revision. Binomial expansion: For weaker candidates just focus on the use of Pascal's triangles as a method of expansion. Teachers who intend to enter students for the coursework option should start collecting the data as soon as practicable in order to allow plenty of time for the interpretation and validation.

Summer Term	Revision and working through AS papers	Revision and working through AS papers	If no January unit taken revision could start at the end of the Spring Term. Make full use of past questions from AQA Specifications A and B papers in revision. June: Students sit MPC2 and Applied Maths unit.
After the AS exams are finished	**Core 3** Numerical Methods (14.6) sec, cosec and cot (14.2)	**Core 3** Definition of a function (14.1) Domain and range (14.1) Composition of functions (14.1) Inverse functions and their graphs (14.1) Modulus(14.1) e^x and ln x (14.3)	Maximise the use of graphical packages in these areas.
Autumn Term Year 13 First half term	Knowledge of $\sin^{-1}$, $\cos^{-1}$ and $\tan^{-1}$ functions (14.2) Understanding of their domains and graphs (14.2) Integration (14.5)	Differentiation (14.4) Combinations of transformations (14.1) **Core 4** Algebra and functions (15.1)	
Second half term	**Core 4** Sequences and series (15.3) Use of formulae for $\sin(A \pm B), \cos(A \pm B)$ and $\tan(A \pm B)$ (15.4) Co-ordinate geometry in the (x, y) plane (15.2) Double angle formulae(15.4) Start revision of Core 3 for January entry	Second Applied Maths Module (**Statistics 1** or **2**, **Mechanics 1** or **2**, **Decision 1** or **2**)	January Candidates can sit MPC3
Spring Term	Continue revision and working through MPC3 papers. Exponentials and Logs (15.5) Differentiation and Integration (15.6) Vectors (15.7) Start revision of MPC4 for June entry	Support the revision programme in preparation for the January module Continue with the Second Applied Maths module	It is worth considering bring in Vectors (15.7) into the Autumn term for those students who will be taking Mechanics 2 as their second application module. Suggest that in this situation Vectors would be taught by Teacher 2. June entry in MPC4 and Applied Maths unit.

Summer Term	Continue with revision programme	Revision for examination in June	

10.4 Scheme 2 (for MPC1 with 2 teachers)

The number of hours is only a general indication. The specification gives more detail about the topics.

Work Scheme – Teacher A

Topic	Notes	Hours
Use and manipulation of surds.	See specification for level of difficulty.	2
Equation of a straight line. Conditions for lines to be parallel or perpendicular to each other. Mid-point of a line. Distance between two points.	$y = mx + c$ $y - y_1 = m(x - x_1)$ $ax + by + c = 0$ and graph of a straight line. Knowledge that the product of the gradients of perpendicular lines is –1. Problems using this knowledge. Graphical illustration.	3
Graphs of quadratic functions. Include use of f(x) notation. Factorisation of quadratic polynomials – use in solving quadratic equations. Completing the square. Use in solving quadratic equations and in finding maximum and minimum values of a quadratic polynomial. The graph of $y = (x - a)^2 + b$ as a translation of the graph of $y = x^2$. Solving quadratic equations by formula. The discriminant of a quadratic function.	As the other techniques in this section are covered, they can be illustrated by reference to the graph. Note terms 'vertex' and 'line of symmetry' need to be known. See specification for level of difficulty. Include negative coefficients of x^2 and rearrangement of equations. See specification for level of difficulty. Include surd manipulation in solving equations. Formula needs to be learnt. Use in determining no. of real roots.	7
Solution of linear and quadratic inequalities.	Include surds in linear inequalities and in associated roots of the quadratic. Graphical illustration. Cover applications involving the discriminant e.g. determine the range of values of k for which $x^2 + (k+2)x + (2k + 1) = 0$ has distinct real or non-real or equal roots.	3
Simultaneous equations including one linear and one quadratic. Intersection of two straight lines and of a straight line and the graph of a quadratic function.	Revise two linear equations by elimination and by substitution. Linear and quadratic mostly by substitution but cover cases when elimination is possible. Including the cases when the straight line is a tangent to the quadratic, intersects it two distinct points and does not intersect it. Links with quadratic functions and quadratic inequalities.	3

Coordinate geometry of the circle. $(x-a)^2+(y-b)^2=r^2$ as a translation of $x^2+y^2=r^2$. Graphs of circles. The equation of the tangent and normal at a given point to a circle. The intersection of a straight line and a circle.	Including the form $(x-a)^2+(y-b)^2=r^2$ using the distance formula and using completing the square to put the equation in this form to determine the coordinates of the centre and the radius. Calculus not required. Use of the coordinates of appropriate points to find gradients. Problems involving the use of: (i) the angle in a semicircle is a right angle; (ii) the perpendicular from the centre to a chord bisects the chord; (iii) the tangent to a circle is perpendicular to the radius at the point of contact. Algebraic methods. Geometrical interpretation of equal roots, distinct real roots and no real roots. Links with quadratic functions and quadratic inequalities.	4

Work Scheme – Teacher B

Topic	Notes	Hours
Algebraic manipulation of polynomials, including expanding brackets and collecting like terms.	Include use of f(x) notation.	1
Simple algebraic division. Use of the Factor Theorem. Use of the Remainder Theorem	See specification for level of difficulty. See specification for level of difficulty. Use in solving cubic equations. See specification for level of difficulty. Including questions such as e.g. find the values of p and q in $f(x)=x^3+px^2+qx-8$ given $(x-1)$ is a factor and the remainder when f(x) is divided by 2 is 24.	4
Graphs of cubic functions.	Using the factor theorem.	1
Differentiation – general introduction to gradient of a curve. Differentiation of polynomials. Gradient of a curve.	Introduction to $\frac{dy}{dx}$ and $f'(x)$ notation. Use graphics calculator, zooming to illustrate linearity of graphs. Perhaps look at $\underset{h\to 0}{Lt}\left(\frac{(x+h)^2-x^2}{h}\right)=\underset{h\to 0}{Lt}(2x+h)=2x$ although not tested on specification Formula needs to be learnt.	3
Equations of tangents and normals.	Problems based on these and on coordinate geometry of a straight line.	2
Stationary points. Maxima and minima. Use of second order derivatives.	Related to graphs and to optimising a single variable in a practical problem e.g. maximizing volume of a cuboid etc. Refer back to sketching quadratics and extend sketching cubics to include max. and min. points. $\frac{d^2y}{dx^2}=\frac{dg}{dx}$ where g is gradient function. Graphical illustration.	4

Increasing and decreasing functions.	Might be more logically covered before stationary points but need to be sure inequalities securely covered. Including general discussion of derivative as a rate of change and graphical illustration. Finding ranges of values for which a function is increasing/decreasing including for a cubic leading to a quadratic inequality.	2
Integration as the reverse of differentiation. Integration of polynomials.	Indefinite integration. Formula needs to be learnt. Include finding the equation of a curve given the gradient function and a point on the curve.	1
Area under a curve. Definite integration.	Including areas below the x-axis. Problems including composite areas and intersection of a straight line and a quadratic curve.	4

10.5 Schemes 3 and 4 (sections of content not divided between teachers)

The schemes shown above divide some of the sections within modules between two teachers. The following two possibilities are based on a more straightforward division of the content, with each section of the specification e.g.12.2 Coordinate Geometry wholly taught by one of the teachers. Both schemes assume equal contact time for teachers A and B.

In the first outline scheme, both teachers would complete their sections of MPC1 at about the same time, so this would work well where students take MPC1 in January.

In the second outline scheme, the start of MPC2 teaching would be staggered, and this might be suitable where students do not take a unit in January.

Scheme 3	**Teacher A**	**Teacher B**
MPC1	12.1 Algebra	12.2 Coordinate geometry 12.3 Differentiation 12.4 Integration
MPC2	13.1 Algebra 13.2 Sequences and series 13.4 Exponentials and logs	13.3 Trigonometry 13.5 Differentiation 13.6 Integration

Scheme 4	**Teacher A**	**Teacher B**
MPC1 **and** **MPC2**	12.1 Algebra 12.2 Coordinate geometry 13.1 Algebra 13.2 Sequences and series	12.3 Differentiation 12.4 Integration 13.5 Differentiation 13.6 Integration 13.3 Trigonometry 13.4 Exponentials and logs

10.6 Scheme 5 (AS Further Maths)

The following suggestion is based on a 1:2 contact time split between Teacher A and Teacher B. It is designed to allow AS Further Maths to be taught alongside AS Maths, using the course in Scheme 1.

Date	**Teacher A**	**Teacher B**	**Notes**
Autumn Term Yr 12	Matrices (excl. transformations) (16.8) Roots and coefficients of a quadratic equation (16.3) Complex Numbers (16.2) Series (16.4) Graphs of parabolas, ellipses and hyperbolas (16.1) Finding roots of equations(16.6)	First Applied Maths module (suggest MD01)	If MD01 is taught, there is a strong case to enter for assessment in January.
Spring Term	Solving differential equations (16.6) Transformations in $x - y$ plane (16.8) Reducing a relation to a linear law (16.6) Trigonometry (16.7) Graphs of rational functions (16.1) Calculus (16.5)	Second Applied Maths module	
Summer Term	Revision and Preparation for MFP1	Revision and preparation for Applied Maths units	

11 Resources

11.1 Introduction

A list of resources, including textbooks, revision guides, CD-ROMs, websites and software, is given below.

Four publishers are producing textbooks for this specification. AQA has endorsed the textbooks of one of these publishers, Oxford University Press. In addition to the textbooks, some publishers are producing revision books and CD-ROMs for this specification.

A number of other mathematics textbooks, suitable for any specification, are available. Centres choosing to use one of these textbooks should ensure that candidates only cover the material required for this specification.

11.2 Textbooks

Pure Mathematics

Texts produced specifically for this specification:

Advanced Maths for AQA series, Oxford University Press:

Core Maths C1+C2, *Smedley and Wiseman*, 2004, ISBN: 0199149364
Core Maths C3+C4, *Smedley and Wiseman*, 2005, ISBN: 0199149879

SMP AS/A2 Mathematics series, Cambridge University Press:

Core 1 for AQA, *Corporate Author SMP*, 2004, ISBN: 0521605253
Core 2 for AQA, *Corporate Author SMP*, 2004, ISBN: 0521605261
Core 3 for AQA, *Corporate Author SMP*, 2005, ISBN: 0521605296
Core 4 for AQA, *Corporate Author SMP*, 2005, ISBN: 052160530X

Advancing Maths for AQA series, 2nd ed, Heinemann:

Pure Core C1 + C2, *Various authors*, 2004, ISBN: 0435513303
Pure Core C3 + C4, *Various authors*, 2005, ISBN: 0435513311

Advanced Maths series, Pearson Longman:

AS Core for AQA, *Emanuel and Wood*, 2004, ISBN: 0582842379
A2 Core for AQA, *Emanuel and Wood*, 2004, ISBN: 0582842360

Other suitable Pure Mathematics texts:

Discovering Advanced Mathematics: AS Mathematics, 2nd ed
Berry, Fentem, Francis, Graham, de Pomerai, Collins, 2000
ISBN: 000322502X

Discovering Advanced Mathematics: A2 Mathematics
Berry, Fentem, Francis, Graham, de Pomerai, Collins, 2001
ISBN: 0003225038

Do Brilliantly: AS Maths, *Graham, Berry, Williamson*
Collins, 2003, ISBN: 0007171870

Do Brilliantly: A2 Maths, *Graham, Fentem, Berry*
Collins, 2003, ISBN: 0007171951

Further Pure

Texts produced for this specification:

Advanced Maths for AQA series, Oxford University Press:
Further Pure FP1, *Brian Gaulter*, 2004, ISBN: 0199149852

Advancing Maths for AQA series, Heinemann:
Further Pure FP1, *Various authors*, 2004, ISBN: 0435513346

Other suitable Further Pure texts:

Further Pure Mathematics, *Brian and Mark Gaulter*, Oxford University Press, 2001, ISBN: 0199147353 (covers Further Pure 2, 3 and 4)

AQA produced 3 textbooks for the Further Pure units (MAP4, MAP5 and MAP6) in the legacy specification GCE Mathematics A. There are plans to update these texts to match this specification, but in the meantime, teachers will still find these useful, in conjunction with the *Relating the content to previous AQA specifications* section below. The textbooks are available as free downloads, in the GCE Mathematics A section of the AQA website www.aqa.org.uk/.

Statistics

Texts produced for this specification:

Advanced Maths for AQA series, Oxford University Press:

Statistics S1, *Upton and Cook*, 2004, ISBN: 0199149372
Statistics S2, *Upton and Cook*, 2005, ISBN: 0199149860

SMP AS/A2 Mathematics series, Cambridge University Press:

Statistics 1 for AQA, *Corporate Author SMP*, 2004, ISBN: 052160527X
Statistics 2 for AQA, *Corporate Author SMP*, 2005, ISBN: 0521605318

Advancing Maths for AQA series, 2nd ed, Heinemann:

Statistics S1, *Various authors*, 2004, ISBN: 0435513389
Statistics S2, *Various authors*, 2005, ISBN: 0435513397

Other suitable Statistics texts:

Statistics, *Roger Fentem*, Collins Educational Publishers, 1996, ISBN: 000322371-X (useful for MS1A/B, plus MS2A/B)

Statistics (9th ed), *James T McClave & Terry Sincich*, Prentice Hall Publishers, 2003, ISBN: 013065598-8 (covers most of the topics in MS03 and MS04, useful for teachers rather than candidates)

Mathematical Statistics, *John E Freund*, Prentice Hall Publishers, 2003, ISBN: 013565185-9 (covers most of the topics in MS03 and MS04, more than is needed of the mathematical content, useful for teachers rather than candidates)

Teaching Statistics, Blackwell Publishing
Journal published three times a year aimed at teachers of students aged up to 19. See http://science.ntu.ac.uk/rsscse/ts/

Mechanics

Texts produced for this specification:

Advanced Maths for AQA series, Oxford University Press:
Mechanics M1, *Brian Jefferson*, 2004, ISBN: 0199149380
Mechanics M2, *Brian Jefferson*, 2005, ISBN: 0199149895

SMP AS/A2 Mathematics series, Cambridge University Press:
Mechanics 1 for AQA, *Corporate Author SMP*, 2004,
ISBN: 0521605288
Mechanics 2 for AQA, *Corporate Author SMP*, 2005,
ISBN: 0521605326

Advancing Maths for AQA series, 2nd ed, Heinemann:
Mechanics M1, *Various authors*, 2004, ISBN: 0435 513362
Mechanics M2, *Various authors*, 2004, ISBN: 0435 513370

Other suitable Mechanics texts:

Advancing Maths for AQA series, Heinemann, 1st ed, produced for the legacy specification B
Mechanics 4, *Graham, Burrows, Gaulter*, 2001, ISBN: 0435513095
Mechanics 5, *Graham, Burrows, Gaulter*, 2002, ISBN: 0435513109
Mechanics 6, *Graham, Burrows, Gaulter*, 2002, ISBN: 0435513117

Decision

Texts produced for this specification:

Advanced Maths for AQA series, Oxford University Press:
Decision Maths D1, *Brian Jefferson*, 2004, ISBN: 0199149887

Decision 1 for AQA, *Stan Dolan*, Cambridge University Press, 2005,
ISBN: 0521619165

Decision 2 for AQA, *Stan Dolan*, Cambridge University Press, 2005,
ISBN: 0521619173

Advancing Maths for AQA series, 2nd ed, Heinemann:
Decision D1, *Various authors*, 2004, ISBN: 0435 513354

Other suitable Decision texts:

Discovering Advanced Mathematics: Decision Mathematics
de Pomerai, Berry, Collins, 2001, ISBN: 0003225275

General

The Complete A-Z Mathematics Handbook, 3rd ed
Berry, Graham, Sharp, Berry, Hodder & Stoughton, 2003
ISBN: 0340872772

11.3 Revision books

Revision books produced for this specification:

Revise for Advancing Maths for AQA series, Heinemann:

Pure Core Maths 1, 2nd ed, 2005, ISBN: 0435513524
Pure Core Maths 2, 2nd ed, 2005, ISBN: 0435513575
Statistics 1, 2nd ed, 2005, ISBN: 0435513559
Mechanics 1, 2nd ed, 2005, ISBN: 0435513524

Advanced Maths Essentials Series, Pearson Longman:

Core 1 for AQA, Crawshaw, Gordon & Hirani, ISBN 0582836778
Core 2 for AQA, Crawshaw & Hirani, ISBN 0582836808
Core 3 for AQA, Crawshaw & Hirani, ISBN 0582836832
Core 4 for AQA, Crawshaw & Hirani, ISBN 0582836867
Mechanics 1 for AQA, Crawshaw & Hirani, ISBN 0582836891
Statistics 1 for AQA, Crawshaw & Hirani, ISBN 0582836905

11.4 CD-ROMs

CD-ROMs produced for this specification:

Advancing Maths for AQA Solutionbank series, Heinemann:

Pure Core Maths 1+2, Student Edition, 2005, ISBN: 0435513435
Pure Core Maths 1+2, Network Edition, 2005, ISBN: 0435513478
Pure Core Maths 3+4, Student Edition, 2005, ISBN: 0435513443
Pure Core Maths 3+4, Network Edition, 2005, ISBN: 043551346X
Mechanics 1, Student Edition, 2005, ISBN: 0435513486
Mechanics 1, Network Edition, 2005, ISBN: 0435513494
Statistics 1, Student Edition, 2005, ISBN: 0435513508
Statistics 1, Network Edition, 2005, ISBN: 0435513516

AS Core Teacher Support CD-ROM, Pearson Longman
A2 Core Teacher Support CD-ROM, Pearson Longman

11.5 Websites

Royal Statistical Society Centre for Statistical Education (http://science.ntu.ac.uk/rsscse/)

Hyperstat online textbook, introduction to Statistics
http://davidmlane.com/hyperstat/contents.html/

National Statistics, official UK statistics, lots of data available
http://www.statistics.gov.uk/

University of Exeter, Centre for Innovation in Mathematics Teaching, with links, http://www.ex.ac.uk/cimt/

University of Glasgow, Statistical Education through Problem Solving, free interactive software download
http://www.stats.gla.ac.uk/steps/

Exploring Mathematics Series, previously published as textbooks, contains free investigations and concepts questions for Pure Maths, Statistics and Mechanics. Complete with solutions.
http://www.tech.plym.ac.uk/maths/ctmhome/resources_exploring.htm/

11.6 Software

Exampro, package mapping past questions to current content, being updated for this specification.
http://www.exampro.co.uk/sec/index.asp/

AUTOGRAPH, a graphical and statistical package, useful for ICT enhanced learning in mathematics. Available from: Eastmond Publishing Ltd, PO Box 46, Oundle, PE8 4JX, www.autograph-maths.com.

12 Relating the content to previous AQA specifications

12.1 Introduction

This section relates the content in the new specification to that contained in the two previous specifications, GCE Mathematics A and GCE Mathematics and Statistics B. In the tables that follow, each topic is listed next to the new specification unit in which it is contained. The next two columns show where the same content can be found in specification A or B.

The content of units listed under Specification A or B may not be included in the corresponding new specification unit in its entirety. The mapping aims to show where the new specification material can be found in the previous specifications rather than vice versa.

In a number of cases, the material now included in a topic area in a new specification unit is spread over more than one unit in the previous specifications. Where this is the case, all relevant previous specification units are listed. The first Specification A or B unit listed will usually contain all the material except for those areas identified in brackets after the subsequent units.

A few topics will be new to centres which previously followed specification A or B. Where new material is included, this will be noted in the table.

Some topics have been deleted and, for those Pure units used in A level maths in the previous specifications, these are identified in section 12.3.

12.2 Relationship to previous specifications

New Spec Unit	Topic	Code for unit containing the topic	
		Specification A	Specification B
MPC1	Algebra	MAME MAP1 (parts on graphs) MAP2 (algebraic division and Remainder Theorem)	MBP1 MBP2 (manipulation of polynomials, graphs, Factor Theorem) MBP4 (algebraic division and Remainder Theorem)
MPC1	Coordinate Geometry	MAME MAP2 (parts on circles and intersection of straight line/curve)	MBP1 MBP4 (circles and tangents) MBP5 (Normal)

MPC1	Differentiation	MAME MAP1 (2^{nd} derivative)	MBP1 MBP2 (2^{nd} derivative)
MPC1	Integration	MAME	MBP1
MPC2	Algebra & Functions	MAME (indices) MAP1 (transformations)	MBP1
MPC2	Sequences	MAP1 MAP2 (recurrent relations) MAP3 (binomial)	MBP1 MBP2 (GPs) MBP4 (recurrence & binomial)
MPC2	Trigonometry	MAP1 Assumed background (sin/ cos rules, area of $\triangle$)	MBP1 Assumed background (sin/ cos rules, area of $\triangle$) MBP2 (rads, arc length, area of sector)
MPC2	Exponentials and Logarithms	MAP1 MAP3 ($y = a^x$, $a^x = b$)	MBP2 MBP4 ($a^x = b$)
MPC2	Differentiation	MAP1	MBP1
MPC2	Integration	MAP1 MAP2 (Trapezium rule)	MBP1 MBP5 (Trapezium rule)
MPC3	Algebra & Functions	MAP1	MBP1 MBP2 (modulus)
MPC3	Trigonometry	MAP2	MBP4
MPC3	Exponentials and Logarithms	MAP1	MBP2
MPC3	Differentiation	MAP2 MAP1 (diff'n of exp and ln)	MBP4 MBP2 (of exp and ln)
MPC3	Integration	MAP2 MAP1 (integration of exp and $\frac{1}{x}$)	MBP4 MBP5 (subst/parts) MBP2 (exp and $\frac{1}{x}$)
MPC3	Numerical Methods	MAP2 MAP1 (sign change), New (Simpson's)	MBP5 MBP1 (sign change) MBP4 (iteration)
MPC4	Algebra & Functions	MAP2 MAP3 (PFs)	MBP4
MPC4	Coordinate Geometry	MAP3	MBP5
MPC4	Sequences & Series	MAP3	MBP5

MPC4	Trigonometry	MAP2	MBP4 MBP5 ($a\cos\theta + b\sin\theta$)
MPC4	Exponentials & Logarithms	MAP3	MBP4
MPC4	Differentiation & Integration	MAP3	MBP5 MBP4 (partial fractions)
MPC4	Vectors	MAP3	MBP5
MFP1	Algebra and Graphs	Some new MAP2 (Rat'l fns $\frac{ax+b}{cx+d}$) MAP3 (parabolas, ellipses and hyperbolas – sketching and intersections. Not $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$)	MBP3 (Rat'l fns $\frac{ax+b}{cx+d}$, some of parabolas, ellipses, hyperbolas) MBP5 (Other rat'l fns listed) MBP7 (Rest of parabolas, ellipses, hyperbolas) Some new.
MFP1	Complex Numbers	MAP4	MBP3 New (Solving eqns)
MFP1	Roots and coefficients of a quadratic equation	MAP2	MBP3
MFP1	Series	MAP4	MBP1
MFP1	Calculus	New MAP5 (improper integrals)	MBP1 New (improper integrals)
MFP1	Numerical Methods	MAP1 (roots) MAP2 (Newton-Raphson) MAP3 (DEs) New (Reduc'n to linear law)	MBP4 (roots) New (DEs) MBP3 (Reduc'n to linear law)
MFP1	Trigonometry	New MAP1 (exact values)	MBP5 (GSs) MBP2 (exact values)
MFP1	Matrices and Transformations	MAP6	MBP3
MFP2	Roots of Polynomials	MAP4	MBP7 (possibly extended) MBP3 (conjugate pairs)
MFP2	Complex Numbers	MAP4	MBP3 MBP6 (Argand diagram) MBP7 (simple loci)
MFP2	De Moivre's Theorem	MAP4	MBP6 New (exp form for numbers with modulus $\neq 1$)

MFP2	Proof by Induction	MAP4	New MBP3 (appl to series)
MFP2	Finite Series	MAP4	MBP3 New (partial fractions)
MFP2	Hyperbolic Functions	MAP4	MBP6
MFP2	Arc length and Area of surface of revolution about the x-axis	MAP4	MBP6
MFP3	Series and Limits	MAP5 MAP3 (Maclaurin)	MBP7 New ($\lim x^k e^{-x}$ & $x^k \ln x$, improper integrals)
MFP3	Polar Coordinates	MAP5	MBP3 MBP7 (area formula)
MFP3	Differential Equations	MAP5	MBP5 New (order/no. of consts)
MFP3	Differential Equations – First Order	MAP5	New MBP6 (solving by IF)
MFP3	Differential Equations – Second Order	MAP5	MBP6 New (reduct'n to sim eqns)
MFP4	Vectors and Three-Dimensional Coordinate Geometry	MAP6 MAP3 (Vector eqn of plane, intersection of line & plane or two planes) New (Direction cosines)	MBP7 MBP5 (Vector eqn of plane, angle between line & plane or two planes) New (intersection of line & plane, direction ratio/ cosine, scalar triple prod)
MFP4	Matrix Algebra	MAP6 New (reflection $x = y$, $y = z, z = x$, invar pts, $\mathbf{M}^n = \mathbf{U}\mathbf{D}^n\mathbf{U}^{-1}$)	New MBP3 (2×2 matrix alg, transformations) MBP6 (2×2 eigenvectors/ values, invar pts/lines)
MFP4	Solution of Linear Equations	MAP6	MBP7
MFP4	Determinants	MAP6 New (factorisation)	MBP3 MBP7(3^{rd} order dets, factorisation) New (volume scale factor)
MFP4	Linear Independence	MAP6	New
MS1A/B	Numerical Measures (some covered in GCSE Maths)	MAME	MBS1

MS1A/B	Probability	MAME	MBS1 New (set notation)
MS1A/B	Binomial Distribution	MAS1/W	MBS1 New (use of formula)
MS1A/B	Normal Distribution	MAS1/W	MBS1
MS1A/B	Estimation	MAS1/W (sampling not tested in written paper)	MBS1
MS1A/B	Correlation and Regression	MAS4/W New (residuals)	MBS1
MS2A/B	Discrete Random Variables	MAS1/W MAME (Intro to Discrete RVs)	MBS4
MS2A/B	Poisson Distribution	MAS2/W	MBS1 New (use of formula)
MS2A/B	Continuous Random Variables (incl rectangular)	MAS2/W MAS1/W (Rect. dist'n)	MBS4 New (distribution functions & percentiles, simple functions)
MS2A/B	Estimation	MAS3/W (only CI for mean using *t* distribution)	MBS4 (CI for mean using *t* distribution)
MS2A/B	Hypothesis Testing	MAS2/W MAS3 (mean using *t*-test)	MBS4
MS2A/B	Contingency Table Tests	MAS2	MBS4
MS03	Further Probability	New	New
MS03	Linear Combinations of Random Variables	MAS2/W New (2 dependent events)	New MBS7 (indep normals)
MS03	Distributional Approximations	MAS2/W MAS1W (Bin/normal approx) New (pfs of mean, var, sd of Bin/Poisson)	MBS2 New (pfs of mean, var, sd of Bin, Poisson)
MS03	Estimation	MAS4/W MAS3 (CI for diff between 2 indep normals, known var) New (Poisson means)	New MBS2 (estimate/CI for proportion and Poisson mean)

MS03	Hypothesis Testing	MAS4/W MAS3 (est for diff between 2 indep normals, known var) New (Poisson means, power of a test)	New MBS3 (e=0 test) MBS7 (Test for proportion/Poisson mean)
MS04	Geometric and Exponential Distributions	MAS2/W (Geometric) MAS3 (Exponential)	New (Geometric) MBS7 (Exponential)
MS04	Estimators	MAS4/W	New
MS04	Estimation	MAS3	New MBS7 (Variance of normal)
MS04	Hypothesis Testing	MAS3	New MBS7 (Variance of normal)
MS04	Goodness of Fit Tests	MAS2/W	MBS7
MM1A/B	Mathematical Modelling	MAM1/W	MBM1
MM1A/B	Kinematics and 1 and 2D	MAM1/W New (average velocity)	MBM1 New (average velocity)
MM1A/B	Statics and Forces	MAM1/W	MBM1
MM1A/B	Momentum	MAM1/W	MBM1 MBM4 (2D case)
MM1A/B	Newton's Laws of Motion	MAM1/W	MBM1
MM1A/B	Connected Particles	MAM1/W	MBM1
MM1A/B	Projectiles	MAM1/W	MBM1
MM2A/B	Math. Modelling	MAM2/W	MBM1
MM2A/B	Moments, C of M	MAM3 MAM2/W (basic def'ns, C of M of system of particles/ composite body)	MBM1
MM2A/B	Kinematics	MAM1/W	MBM2
MM2A/B	Newton's Laws	MAM2/W	MBM2
MM2A/B	Application of Simple Differential Equations	MAM4/W	MBM2
MM2A/B	Uniform Circular Motion	MAM2/W	MBM2
MM2A/B	Work and Energy	MAM2/W	MBM2

MM2A/B	Vertical Circular Motion	MAM2/W	MBM5
MM03	Relative Motion	New	MBM4
MM03	Dimensional Analysis	New	MBM4
MM03	Collisions on One Dimension	MAM2/W	MBM4 MBM5 ($\mathrm{I} = \int F \mathrm{d}t$)
MM03	Collisions in Two Dimensions	MAM2/W New (oblique collisions)	MBM4 New (oblique collisions)
MM03	Further Projectiles	MAM1/W	MBM1
MM03	Projectiles on an Inclined Plane	New	MBM5
MM04	Moments	MAM3	MBM4
MM04	Frameworks	MAM3	MBM4
MM04	Vector Products and Moments	New	MBM5
MM04	Centres of Mass by Integration	MAM3	MBM2
MM04	Moments of Inertia	MAM3	MBM6
MM04	Motion of a Rigid Body about a Fixed Axis	MAM3	MBM6
MM05	Simple Harmonic Motion	MAM4/W	MBM2 MBM5 (simple pendulum)
MM05	Forced and Damped Harmonic Motion	MAM4/W	MBM5
MM05	Stability	New	MBM6
MM05	Variable Mass Problems	MAM4/W	MBM5
MM05	Motion in a Plane with Polar Coords	MAM4/W	MBM6
MD01	Algorithms	MAD1	New
MD01	Graphs and Networks	MAD1	MBD1 New (adjacency/distance matrix, bipartite graphs)
MD01	Spanning Tree	MAD1	MBD1
MD01	Matchings	MAD1	New
MD01	Shortest Paths in Networks	MAD1	MBD1

MD01	Route Inspection Problem	MAD1	MBD2
MD01	Travelling Salesperson Problem	MAD1	MBD2
MD01	Linear Programming	MAD1	MBD1
MD01	Mathematical Modelling	New	New
MD02	Critical Path Analysis	MAD2	MBD1 (with activity on node)
MD02	Hungarian Algorithm	MAD2	New
MD02	Dynamic Programming	MAD2 New (max path, maximin/ minimax)	New
MD02	Network Flows	MAD2	MBD2
MD02	Linear Programming	MAD2	MBD2
MD02	Game Theory	MAD2	New
MD02	Modelling	New	New

12.3 Pure Content Removed

Some material from the legacy GCE Mathematics specifications, contained in those Pure units which contributed towards the AS and A Level Mathematics awards, has not been included in this specification. Such topics from those units are listed below.

Specification A

MAP1: Proofs as a topic, interval bisection and linear interpolation, exact trig values.
MAP2: Newton/Raphson.
MAP3: Connected rate of change, Maclaurin series, vectors applied to planes.

Specification B

MBP1: Σr^2 etc, differentiation from first principles.
MBP2: Exact trig values
MBP4: Angle between lines in 2D, divergent, oscillating and periodic sequences, connected rates of change, bisection and decimal search, linear interpolation, Newton / Raphson.
MBP5: Quadratic over quadratic, 3rd derivative, points of inflection, area under curve defined parametrically.

Other Information

13 AS and A Level Statistics

AQA now offers GCE Statistics as a separate specification. The AS and A level Statistics qualifications may appeal to the candidate who wishes to pursue the study of a numerate post-16 subject, but does not want to study Pure Mathematics.

GCSE Statistics is not a pre-requisite for this specification.

The emphasis is on using and applying statistics. Appropriate interpretation of contexts and the outcomes of statistical procedures are required.

The content of the AS specification includes statistical knowledge, skills and techniques which are needed for the study of other subjects, such as Biology, Economics, Geography, Psychology and Business Studies.

The A2 specification is designed to give an understanding of the calculation of statistical measures, as well as their application and interpretation, without requiring knowledge of Pure Mathematics beyond GCSE.

One unit (Statistics 1) is common to both the GCE Mathematics and GCE Statistics specifications. This unit may be partially assessed by coursework, or may be wholly assessed by written examination. All other units are assessed by written examination only.

The first AS awards will be made in June 2005, and the first A level awards in June 2006.

For further details of the GCE Statistics specification, contact the GCE Mathematics subject team (see the Contact Details section).

14 FSMQ and AS Use of Mathematics

14.1 Free Standing Mathematics Qualifications

FSMQs (Free Standing Mathematics Qualifications) are qualifications aimed primarily at candidates who want to continue the study of Mathematics after GCSE, but do not want to embark on a full AS or A Level course, at least not immediately.

As a guide, approximately 60 hours teacher-candidate contact time is recommended for each FSMQ. 50% of the assessment is by coursework portfolio, with the other 50% being by written paper. Qualifications are available at 3 different levels: Foundation, Intermediate and Advanced.

Foundation level is designed for candidates of ability equivalent to G – D at GCSE. There are three Foundation level FSMQs currently available: Managing Money, Working in 2 and 3 dimensions, and Making Sense of Data.

Intermediate level is designed for candidates of ability equivalent to C – A* at GCSE. There are five Intermediate level FSMQs currently available: Calculating Finances, Solving Problems in Shape and Space, Handling and Interpreting Data, Making Connections in Mathematics, and Using Algebra, Functions and Graphs.

Advanced level is designed to be of a similar standard to AS level. There are three Advanced level FSMQs currently available: Using and Applying Statistics, Working with Algebraic and Graphical Techniques, and Modelling with Calculus.

For further details about these qualifications, please contact the GCE Mathematics subject department.

14.2 AS Use of Mathematics

AS Use of Mathematics is made up of an Applying Mathematics unit, assessed by 2 written papers, along with two of the Advanced level FSMQs.

For further details about this qualification, please contact the GCE Mathematics subject department.

15 Glossary of Terms

Advanced Subsidiary	This is the first half of the Advanced Level course.
A2	This is the second half of the Advanced Level course.
Aims	The broad educational or vocational purposes of a qualification.
Assessment Objectives	The criteria used to evaluate candidates' attainments.
Assessment Unit	The smallest part of a qualification that can be separately certificated.
C2K	Shorthand for the GCE specifications introduced for first teaching from September 2000.
Coursework	Tasks set and undertaken during the course which are integral to the course of study.
Entry Codes	The codes to be used when entering candidates for each unit and each qualification.
External Assessment	A form of independent assessment in which an awarding body sets or defines assignments, tests or examinations, specifies the conditions under which they are to be taken (including details of supervision and duration), and assesses candidates' responses.
Internal Assessment	A form of assessment that does not meet the definition of external assessment for a general or vocational qualification.
Internal Standardisation	The requirement for centres to standardise assessment across different teachers and teaching groups to ensure that all candidates at each centre have been judged against the same standards.
Moderation	The process through which internal assessment is monitored by an awarding body to ensure that internal assessment is valid, reliable, fair and consistent with required standards.
Module	Specified teaching and learning requirements associated with an identifiable part of a qualification.
Shelf-life of units	The length of time a unit can be stored and put towards a subsequent qualification. For this specification, the shelf-life of units is restricted only by the life of the specification.
Specification	The complete description of the content, assessment arrangements and performance requirements for a qualification. This has replaced the term 'syllabus'.
Staged Assessment	Assessment arrangements in which assessment units are taken throughout a period of learning.
Synoptic Assessment	A form of assessment which tests candidates' understanding of the connections between the different elements of a subject.