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Course Title:
Getting Ready to Teach Pearson Edexcel International GCSE (9-1) Mathematics (A & B) specifications for first teaching from September 2016

Event Code: 16IOAM08

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Your trainer today is:

Greg Attwood

Aims and Objectives

This session is designed to give you information about the changes to International GCSE Maths.

By the end, you should know about

- Changes in the grading system
- Changes in specification content
- Important dates

and feel happy about starting to teach Edexcel International GCSE (9-1) Mathematics A or B

Session Agenda

2.30	Welcome Overview of changes to International GCSE Maths, including grading and basic content.
3.00	Content changes for Foundation tier spec A
3.25	Break
3.30	Content changes for Higher tier spec A
3.50	Content changes for spec B
4.25	Problem solving and Reasoning
4.30	Finish

Mathematics Specification A (4MA1)

Poll 1

Roughly what percentage of your current cohort are entered for Foundation Tier?

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Information gained from our consultations:

- International GCSE Maths is valued by teachers and learners as an attractive equivalent to GCSE Maths and an alternative preparation for A level.
- Centres would welcome some updates, rather than large-scale changes to the specification.
- Centres generally would like grades to be on the same scale as for the new GCSE (9-1) Maths.

Following consultations we are making the following changes to International GCSE Maths:

- A move from the current A*-G to the new 9–1 grading structure to maintain comparability with GCSE 9-1 Maths.
- Some minor additions to the content assessed at each tier to reflect this new 9-1 grading structure.
- A few more questions on problem solving and mathematical reasoning.

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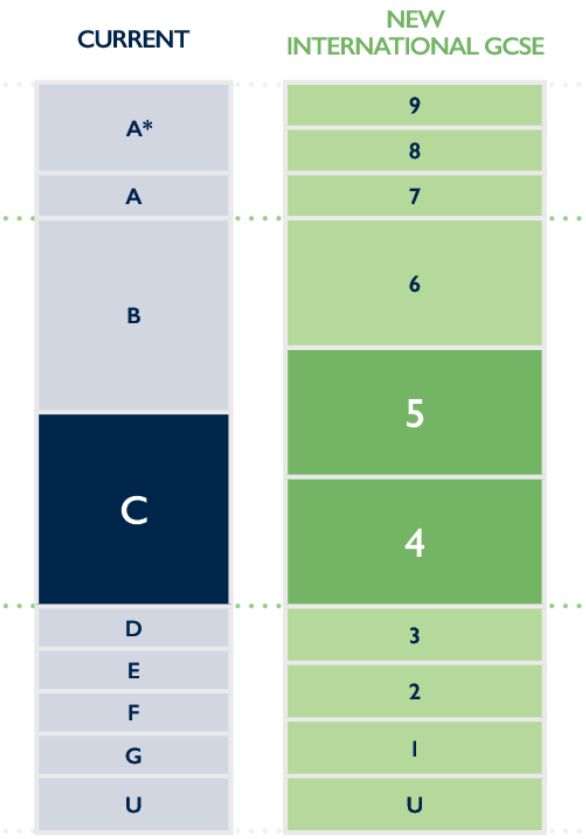
…but…

- The changes are natural extensions of the current content.
- The changes should not involve a large amount of extra teaching time.
- Questions requiring the use of problem solving and mathematical reasoning are nothing new to the International GCSE specification – there is just a slight increase in these.
- Question types and language used will be very similar to those on the current specification.

New 9-1 Scale for GCSE and International GCSE

- **How does it work?**

- New grading scale – therefore no direct comparability with old A*-G
- Grades 4 and 5 align to old grade C
- Grade 7 aligns to grade A
- Grade 8 & 9 align to grade A*
- Grade 9 represents a higher level of attainment than A* grade boundary
- Introduced in GCSE in **3 phases** 2015-2017
- Introduced into new International GCSE in **one phase** for first teaching September 2017
- Option to start early for English and Maths from September 2016



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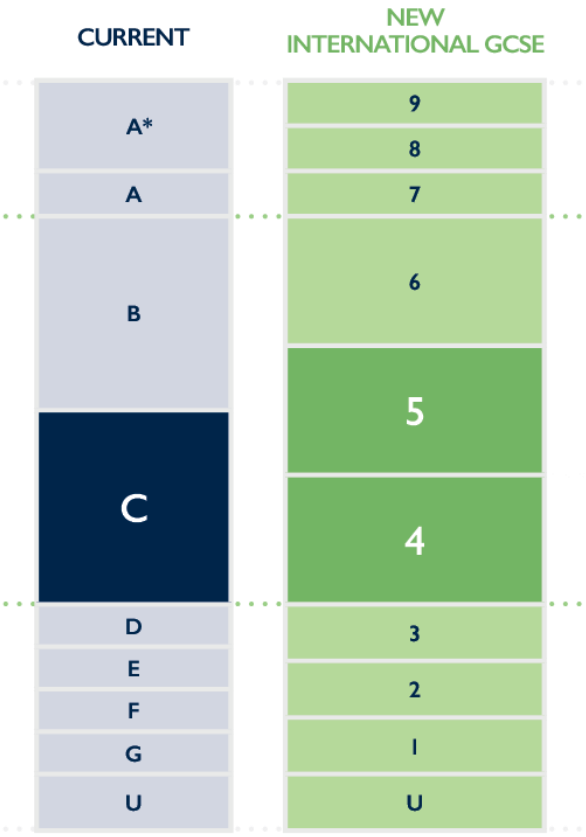
New 9-1 Scale for GCSE and International GCSE

- Why the new scale gives learners better
- opportunities?

- Gives greater scope to differentiate across the levels of attainment, rewarding outstanding achievement
- Rewards outstanding achievement
- Gives teachers more information about students' attainment to help progress to A Level
- Aligning with English national practice ensures international recognition and understanding from universities and ministries around the world
- Allows clear comparison with English standards, unlike old A* to G grading



International centres

For International GCSE Maths A and International GCSE Maths B, you have a choice of first assessment dates. You may choose to start on the new specification this September, using the first available assessment window for the new specification in June 2018.

If you wish to wait, centres can choose to have a first assessment window in June 2019. This will be the first assessment window for all other International GCSE subjects (excluding English where there is also a choice to move a year early too) and so students will receive only 9-1 grades for all subjects in June 2019.

New specifications and sample assessment materials for International GCSE (9-1) Mathematics (4MA1) (4MB1) are in the pack.

Timeline for International GCSE Mathematics (International)

	Sept 2016	Jan 2017	Summer 2017	Jan 2018	Summer 2018	Jan 2019	Summer 2019
Current specification 4MA0		January series as normal	Summer series as normal	January series as normal	Final summer series	Final assessment	
New specification 4MA1/ 4MB1	Optional First teaching				Optional First assessment	January series available	Summer series available (Compulsory assessment window for all centres)

Assessment Structure

Foundation tier (4MA1)

Paper number	Level	Assessment information	Number of raw marks allocated in the paper
Paper 1F (calculator allowed)	Foundation	Assessed through a 2 hour examination set and marked by Edexcel. The paper is weighted at 50% of the qualification, targeted at grades 5 – 1.	100
Paper 2F (calculator allowed)	Foundation	Assessed through a 2 hour examination set and marked by Edexcel. The paper is weighted at 50% of the qualification, targeted at grades 5 – 1.	100

Assessment Structure

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Higher tier (4MA1)

Paper number	Level	Assessment information	Number of raw marks allocated in the paper
Paper 3H (calculator allowed)	Higher	Assessed through a 2 hour examination set and marked by Edexcel. The paper is weighted at 50% of the qualification, targeted at grades 9 – 4 with 3 allowed.	100
Paper 4H (calculator allowed)	Higher	Assessed through a 2 hour examination set and marked by Edexcel. The paper is weighted at 50% of the qualification, targeted at grades 9 – 4 with 3 allowed.	100

Which tier of entry: Foundation or Higher?

- The new Foundation tier goes up to a grade 5, which is of a higher level of demand than the current grade C, and the Higher tier starts at grade 4, which is of a higher level of demand than the current grade D
- Consider how confident your students are with topics that were previously regarded as C grade.
- Common questions on the SAMs appear at the end of the Foundation tier papers and form the first part of the Higher tier paper – how well your students perform on these questions will give you an indication if they are working below, at, or above grades 4 & 5 (the target grades for these questions)

Subject Areas on Specification

A01 (57 – 63%)

- Numbers and the number system.
- Equations, formulae and identities.
- Sequences, functions and graphs.

A02 (22 – 28%)

- Geometry.
- Vectors and transformation geometry.

A03 (12 - 18%)

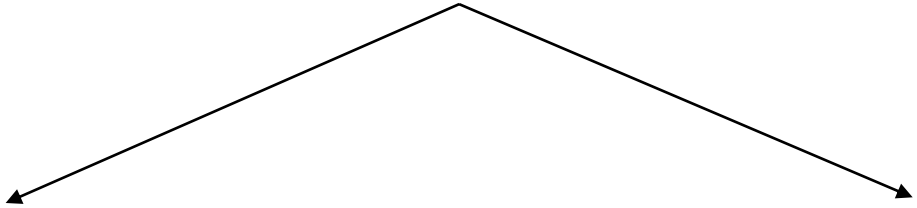
- Statistics and probability.

Relationship of assessment objectives to units

Unit number	Assessment objective		
	AO1	AO2	AO3
Papers 1F and 2F	28.5–31.5%	11–14%	6–9%
Papers 3H and 4H	28.5–31.5%	11–14%	6–9%
Total	57–63%	22–28%	12–18%

A01 Split for Foundation and Higher

A01 (57 - 63% of marks)



Foundation
Number : Algebra
3 : 2

Higher
Number : Algebra
1 : 2

Relationship of problem solving and mathematical reasoning skills to tier

	Problem solving	Reasoning, interpretation and communication
Foundation (1F and 2F)	25%	15%
Higher (3H and 4H)	30%	20%

Marks allocated to Grades

Higher tier

- 40% marks distributed evenly over grades 4 & 5
- 60% of marks distributed over grades 6, 7, 8 & 9

Foundation tier

- All marks distributed evenly over grades 1, 2, 3, 4 & 5

Content changes

- Very similar to KMA0 and 4MA0
- Some topics have moved, so that they can be assessed on the Foundation tier papers as well as on the Higher tier papers, in order to accommodate the award of grade 5 at Foundation tier.
- Introduction of density and pressure.
- Slight increase in the number of questions targeting problem solving as well as questions targeting reasoning, interpretation and communication.
- Reference to Pythagoras' theorem and the trigonometric ratios has been deleted from the formulae sheet; candidates are expected to know them.

Foundation tier – new content

1.2 Fractions	**F**	use common denominators to add and subtract fractions and mixed numbers
	I	multiply and divide fractions and mixed numbers

SAMs Paper 2F q25 / Paper 4H q10 (part (b) only)

(a) Show that $\frac{5}{9} + \frac{1}{6} = \frac{13}{18}$ (2)

(b) Show that $4\frac{2}{3} \div 3\frac{5}{9} = 1\frac{5}{16}$ (3)

1.3 Decimals	**B** understand place value

Candidates are expected to be able to write down the value of, for example, the digit 5 in the number 32.157

1.4 Powers and roots	**C**	use index notation and index laws for multiplication and division of positive and negative integer powers including zero
	E	find highest common factors (HCF) and lowest common multiples (LCM)

Candidates may, for example, be asked to simplify $5^{-6} \times 5^{2}$ and give their answer as a power of 5

SAMs Paper 2F q16 / Paper 4H q1

Find the lowest common multiple (LCM) of 20, 30 and 45

(3)

1.5 Set language and notation	**D**	understand and use the complement of a set
	E	use Venn diagrams to represent sets

1.6 Percentages	**F**	use reverse percentages
	G	use compound interest and depreciation

SAMs Paper 1F q23 / Paper 3H q8

In a sale, all normal prices are reduced by 15%
The normal price of a mixer is reduced by 22.50 dollars.

Work out the normal price of the mixer.

(3)

SAMs Paper 2F q23 / Paper 4H q8

Kwo invests HK$40 000 for 3 years at 2% per year compound interest.
Work out the value of the investment at the end of 3 years.

(3)

1.9 Standard form	**A**	calculate with and interpret numbers in the form $a \times 10^n$ where n is an integer and $1 \leqslant a < 10$

SAMs Paper 1F q24 / Paper 3H q9

The table shows the diameters, in kilometres, of five planets.

Planet	Diameter (km)
Venus	1.2×10^4
Jupiter	1.4×10^5
Neptune	5.0×10^4
Mars	6.8×10^3
Saturn	1.2×10^5

(a) Write 1.4×10^5 as an ordinary number.

(1)

(b) Which of these planets has the smallest diameter?

(1)

(c) Calculate the difference, in kilometres, between the diameter of Saturn and the diameter of Neptune.
Give your answer in standard form.

(2)

Equations, formulae and identities

2.1 Use of symbols	**C**	use index notation for positive and negative integer powers (including zero)

SAMs Paper 2F q19 / Paper 4H q4

(a) Simplify $p^5 \times p^4$

(1)

(b) Simplify $(m^4)^{-3}$

(1)

(c) Write down the value of c^0

(1)

2.2 Algebraic manipulation	**D**	take out common factors
	F	understand the concept of a quadratic expression and be able to factorise such expressions (limited to $x^2 + bx + c$)

SAMs Paper 1F q21a / Paper 3H q6a

Factorise fully $18e^3f + 45e^2f^4$

(2)

e.g. Factorise $x^2 + 2x - 15$, factorise $x^2 - 25$

2.3 Expressions and formulae	**F**	change the subject of a formula where the subject appears once

For example: make q the subject of $x = 7q + 3$

or make y the subject of $w = 6y^2$

2.6 Simultaneous linear equations	**A**	calculate the exact solution of two simultaneous equations in two unknowns

SAMs Paper 2F q24 / Paper 4H q9

Solve the simultaneous equations $3x + y = 13$

$x - 2y = 9$

Show clear algebraic working.

(3)

The requirement to show clear algebraic will still be given (as here); the correct answer without supporting algebraic working will not score any marks.

2.7 Quadratic expressions	**A**	solve quadratic equations by factorisation (limited to $x^2 + bx + c = 0$)

SAMs Paper 1F q21b / Paper 3H q6b

Solve $x^2 - 4x - 12 = 0$

Show clear algebraic working.

(3)

Sequences, functions and graphs (A01)

3.1 Sequences	**C**	use linear expressions to describe the *n*th term of arithmetic sequences

SAMs Paper 2F q17 / Paper 4H q2

The first four terms of an arithmetic sequence are

2 9 16 23

Write down an expression, in terms of *n*, for the *n*th term.

(2)

3.3 Graphs	**H**	recognise that equations of the form $y = mx + c$ are straight line graphs with gradient m and intercept on the y-axis at the point $(0, c)$
	I	recognise, generate points and plot graphs of linear and quadratic functions

The requirement in 3.3H has been extended so that candidates could, for example, be asked to write down the gradient and the coordinates of the *y* axis intercept of the graph of y = 3x + 4. The inclusion of the word 'recognise' in 3.3I means that candidates could, for example, be given the graphs of several linear functions and then be asked to identify which of these is the graph of $y = 2x + 1$

Geometry and Trigonometry (A02)

4.4 Measure	**G**	use compound measure such as speed, density and pressure

The formula for pressure will be given if required.

The questions from the SAMs shown below is a more demanding question testing knowledge of density in a problem.

SAMs Paper 2F q18 / Paper 4H q3

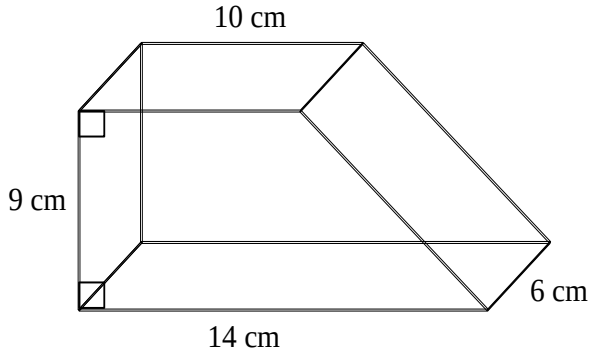


Diagram **NOT** accurately drawn

The diagram shows a solid prism. The cross section of the prism is a trapezium.

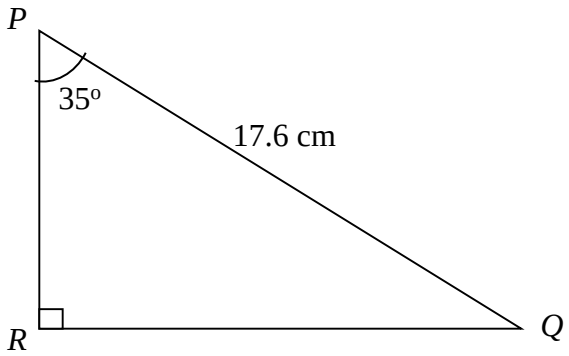
The prism is made from wood with density 0.7 g/cm^3

Work out the mass of the prism.

(4)

4.8 Trigonometry and Pythagoras' theorem	**A**	know, understand and use Pythagoras' Theorem in two dimensions
	B	know, understand and use sine, cosine and tangent of acute angles to determine lengths and angles of a right-angled triangle

SAMs Paper 1F q22 / Paper 3H q7



Calculate the length of *PR*.
Give your answer correct to 3 significant figures.

(3)

4.9 Mensuration of 2-D shapes	**E**	find circumferences and areas of circles using relevant formulae; find perimeters and areas of semicircles

SAMs Paper 1F q25 / Paper 3H q10

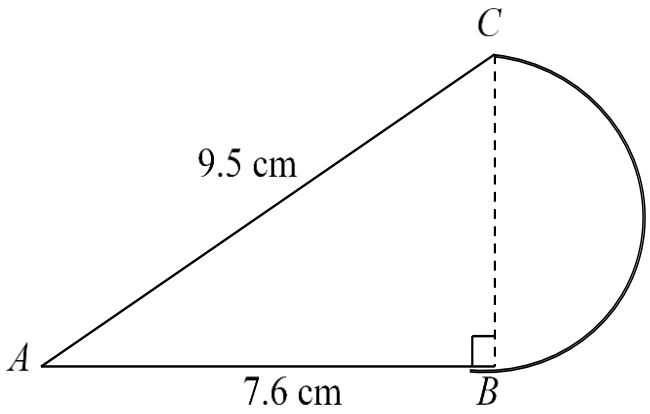


Diagram **NOT** accurately drawn

The diagram shows a shape made from triangle *ABC* and a semicircle with diameter *BC*.
Triangle *ABC* is right-angled at *B*.
AB = 7.6 cm and *AC* = 9.5 cm.

Calculate the area of the shape.
Give your answer correct to 3 significant figures.

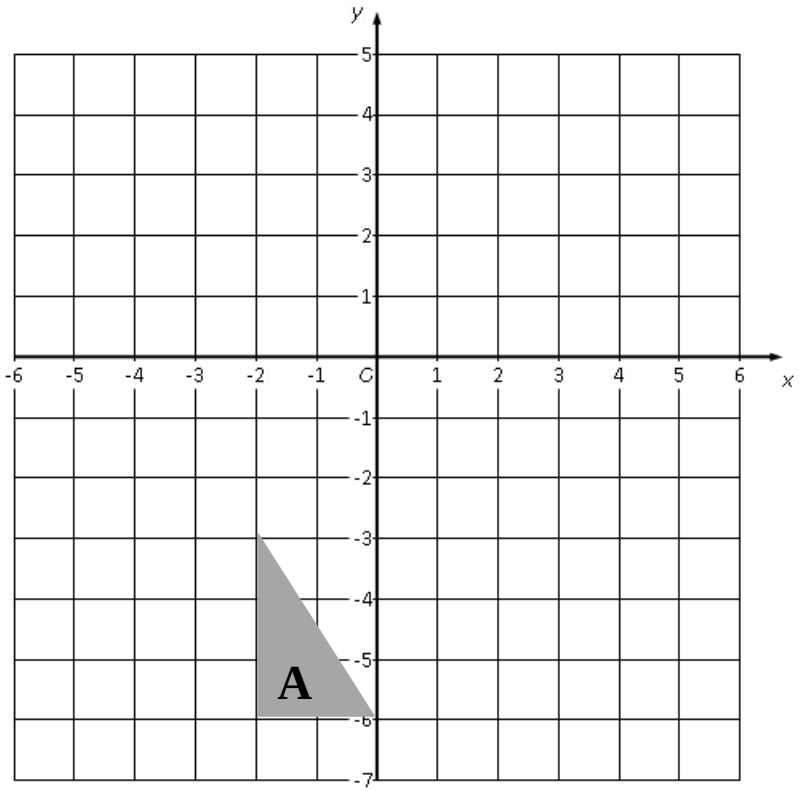
(5)

This question is a good example of one requiring 'problem solving skills' in that the student needs to translate the problem into a series of mathematical processes – the student needs to interpret the question and decide how to solve it.

Vectors and transformation geometry (A02)

5.2 Transformation geometry	**H**	understand and use column vectors in translations

SAMs Paper 2F q21 / Paper 4H q6



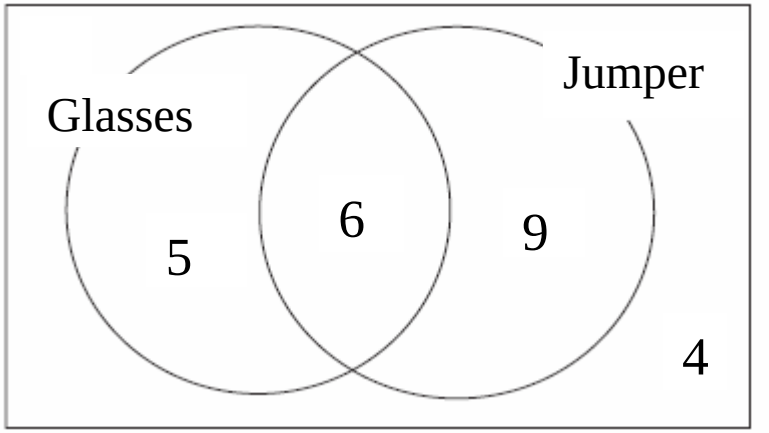
(a) On the grid, translate triangle **A** by the vector $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$

(1)

Statistics and probability (A03)

6.3 Probability	D Find probabilities from a Venn diagram.

This will link in with the new work in section 1.5



The Venn diagram shows the number of children in a class wearing a jumper or glasses.
A child is selected at random.

Find the probability that the child is wearing glasses but is not wearing a jumper.

Higher Tier

Assumes knowledge of Foundation tier – all content included in Foundation tier could be assessed in the Higher tier papers, provided that the question is targeting at least grade 4.

Numbers and the number system (A01)

1.4 Powers and roots	**B**	manipulate surds, including rationalising a denominator

SAMs Paper 4H q24

Show that $\dfrac{\sqrt{12}-1}{2-\sqrt{3}}$ can be written as $4+3\sqrt{3}$

Show your working clearly.

(4)

Equations, formulae and identities (A01)

2.2 Algebraic manipulation	**A**	expand the product of two or more linear expressions
	D	complete the square for a given quadratic expression
	E	use algebra to support and construct proofs

SAMs Paper 3H q11 (3)

Expand and simplify $(x + 5)(x - 3)(x + 3)$

KMAO June 2015 Paper 4H q20b

Show, using algebra, that the sum of any 4 consecutive odd numbers is always a multiple of 8 (3)

1MA0 June 2014 Paper 2H q14b

Prove algebraically that

$(2n + 1)^2 - (2n + 1)$ is an even number for all positive integer values of n.

2.7 Quadratic equations	**B**	solve quadratic equations by using the quadratic formula or completing the square

SAMs Paper 4H q22

(a) Write $2x^2 - 8x + 9$ in the form $a(x + b)^2 + c$

(3)

(b) Hence, or otherwise, explain why the graph of the curve with equation $y = 2x^2 - 8x + 9 = 0$ does not intersect the x-axis.

(1)

Sequences, functions and graphs (A01)

3.1 Sequences	**A**	Understand and use common difference (d) and first term (a) in an arithmetic sequence
	B	Know and use nth term = $a + (n - 1)d$
	C	Find the sum of the first n terms of an arithmetic series (Sn)

SAMs Paper 3H q23

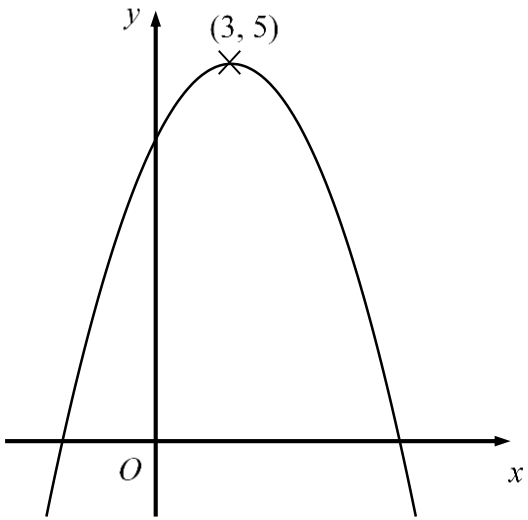
The 4th term of an arithmetic series is 17
The 10th term of the same arithmetic series is 35

Find the sum of the first 50 terms of this arithmetic series.

(5)

3.3 Graphs	**A**	Recognise, plot and draw graphs with equation: $y = Ax^3 + Bx^2 + Cx + D$ in which: (i) The constants are integers and some could be zero (ii) The letters x and y can be replaced with any other two letters or: $y = Ax^3 + Bx^2 + Cx + D + \frac{E}{x} + \frac{F}{x^2}$ in which: (i) The constants are numerical and at least three of them are zero (ii) The letters x and y can be replaced with any other two letters or: $y = \sin x$, $y = \cos x$, $y = \tan x$ for angles of any size (in degrees)
	B	apply to the graph of $y = f(x)$ the transformations $y = f(x) + a$, $y = f(ax)$, $y = f(x + a)$, $y = af(x)$ for linear, quadratic, sine and cosine functions
	C	interpret and analyse transformations of functions and write the functions algebraically
	G	find the equation of a straight line parallel to a given line; find the equation of a straight line perpendicular to a given line

SAMs Paper 3H q20



The diagram shows part of the curve with equation $y = f(x)$
The coordinates of the maximum point of the curve are (3, 5)

(a) Write down the coordinates of the maximum point of the curve with equation

(i) $y = f(x + 3)$ (1)

(ii) $y = 2f(x)$ (1)

(iii) $y = f(3x)$ (1)

The curve with equation $y = f(x)$ is transformed to give the curve with equation $y = f(x) – 4$

(b) Describe the transformation. (1)

SAMs Paper 3H q13b

Line $\mathbf{L_1}$ has equation $y = 3x + 5$

Line $\mathbf{L_2}$ has equation $6y + 2x = 1$

(b) Show that $\mathbf{L_1}$ is perpendicular to $\mathbf{L_2}$

(2)

3.4 Calculus	**D** Now includes a reference to <u>stationary points</u>

Geometry and Trigonometry (A02)

No new content

But the change in this area is that any reference to Pythagoras' theorem and the trigonometric ratios has been deleted from the formulae sheet.

Vectors and transformation geometry (A02)

5.1 Vectors	**C**	understand and use vector notation including column vectors

SAMs Paper 4H q23

ABCD is a parallelogram.

$$\overrightarrow{AB} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \quad \overrightarrow{AC} = \begin{pmatrix} 9 \\ 4 \end{pmatrix}$$

Find the magnitude of $\overrightarrow{BC}$

(3)

Statistics and probability (A03)

No new content

Specification B (4MB1)

- Higher Tier only (Grades 9 – 4 with 3 allowed)
- Remember:
- grade 4 is roughly equivalent to C grade
- grade 7 is equivalent to A grade
- grade 9 is for highest achievers only

Assessment Structure

Paper number	Level	Assessment information	Number of raw marks allocated in the paper
Paper 1	Higher	Assessed through a 1 hour and 30 minute examination set and marked by Pearson. The paper is weighted at 33 % of the qualification, targeted at grades 9–4 with 3 allowed.	100
Paper 2	Higher	Assessed through a 2 hour and 30 minute examination set and marked by Pearson. The paper is weighted at 66 % of the qualification, targeted at grades 9–4 with 3 allowed.	100

Assessment objectives and weightings

		% in International GCSE
AO1	Demonstrate knowledge, understanding and skills in number and algebra: • numbers and the numbering system • calculations • solving numerical problems • equations, formulae and identities • sequences, functions and graphs • matrices.	57–63%
AO2	Demonstrate knowledge, understanding and skills in shape, space and measures: • geometry and trigonometry • vectors and transformation geometry.	27–33%
AO3	Demonstrate knowledge, understanding and skills in handling data: • statistics • probability.	7–13%

Problem solving and mathematical reasoning skills

	Problem solving	Reasoning, interpretation and communication
Both Papers	30%	20%

Marks allocated to Grades

Higher tier

- 40% marks distributed evenly over grades 4 & 5
- 60% of marks distributed over grades 6, 7, 8 & 9
  - i.e. same as Spec A for both papers

Content changes

- Very similar to 4MB0
- Slight increase in the number of questions targeting problem solving as well as questions targeting reasoning, interpretation and communication.
- Formulae list for paper 2 has been adjusted slightly – the formulae for the circumference and area of a circle will no longer be given. Candidates will be expected to know these in both papers.

Details of content changes

Section 1 Number

1 **E**	Rationalising the denominator

Surds – we now expect candidates to be able to rationalise the denominator for expressions such as $\frac{20}{\sqrt{14}+3}$ or $\frac{15}{\sqrt{7}-2}$

as well as those with a denominator that is a pure surd.

1 **G**	Weights, measures and money	Carry out calculations using standard units of mass, length, area, volume and capacity, time and average speed Metric and SI units only Carry out calculations using money, including converting between currencies (where conversion is required, the rate of conversion will always be given)

We have clarified this section to include the term “average speed”

1 **J**	Solve problems using upper and lower bounds where values are given to a degree of accuracy

This is a new section. It is something that was previously on spec A

e.g. if $x = 15.3$ (to 1 dp) and $y = 28$ (to the nearest integer)

calculate the lower bound of $\frac{x}{y}$

SAMS Paper 1 Qu 8

The lengths of the sides of a rectangle, measured to the nearest 10 mm, are 90 mm and 40 mm.
Find the smallest possible perimeter, in mm, of the rectangle.

(2 Marks)

Details of Content Changes

Section 2 Sets

- There are no changes to this section

Details of content changes
Section 3 Algebra

3 **D**	Use of the factor theorem	Including application to cubics and factors of the form $(ax+b)$ or $(ax-b)$
3 **E**	Algebraic division of a cubic by a linear factor	

We have clarified the work on the use of the factor theorem and factorising algebraic expressions to explicitly include "algebraic division of a cubic by a linear factor"

SAMS Paper 1 Qu 26

(a)Use the factor theorem to show that (2x + 3) is a factor of

$2x^3 - 3x^2 - 17x - 12$ **(2)**

(b) Hence, factorise completely $2x^3 - 3x^2 - 17x - 12$

(4)

3 **G**	Solution of equations of 1st, 2nd and 3rd degree containing one unknown quantity	Solution of quadratics to include solution by factorisation, by graph, by completing the square or by formula Problems that result in the solution of such equations may also be set

This is linked to the previous section.
We have extended the solution of equations to include cubics as well.
So questions of the following form could be asked.

(a) Show that $(2x - 1)$ is a factor of $4x^3 + 16x^2 + 9x - 9$

(b) Solve $4x^3 + 16x^2 + 9x - 9 = 0$

3 **I**	Solve simultaneous equations in two unknowns, one equation being linear and the other being quadratic.

The work on simultaneous equations has been extended to include the case where one equation is linear and the other is quadratic. This brings the specification in line with spec A.

SAMS Paper 2 Qu 5

Solve the simultaneous equations

$$x^2 + y^2 = 5$$
$$x + 1 = y$$

Show clear algebraic working.

(6 marks)

3 **K**	Solve quadratic inequalities in one unknown and represent the solution set on a number line

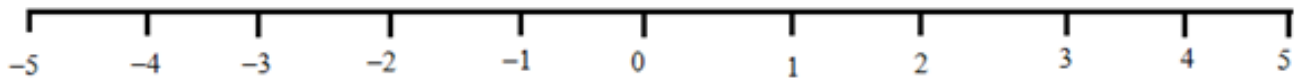
The work on inequalities has been extended to include quadratic inequalities in one unknown. This of course links in with the material on sketching quadratic curves which was on the old 4MB0 specification.

SAMS Paper 1 Qu 27

(a)Solve the inequality $x^2 - x - 6 < 0$

(4)

(b) On the number line below represent your answer to part (a).



(2)

Details of content changes

Section 4 Functions

4 **G**	Variation, direct and indirect proportion	To include only the following: $y \propto x$, $y \propto \frac{1}{x}$ and $y \propto x^2$, $y \propto \frac{1}{x^2}$ $y \propto x^3$, $y \propto \frac{1}{x^3}$ and $y \propto \sqrt{x}$, $y \propto \frac{1}{\sqrt{x}}$

We have clarified the work on direct and indirect proportion by restricting the functions.

4 **I**	Recognise that equations of the form $y = mx + c$ are straight–line graphs with gradient m and intercept on the y-axis at the point $(0, c)$

We have added a section about recognising that equations of the form $y = mx + c$ are straight line graphs with gradient m and y intercept $(0, c)$. Many teachers would already expect their students to know this but we have now made it an explicit requirement.

SAMS Paper 1 Qu 13

The straight line **L** has equation $3y = x - 4$

(a) Find the gradient of **L**.

(2)

(b) Find the intercept of **L** on the y-axis.

(1)

4 **M**	Determination of gradients, rates of change, maxima and minima, stationary points and turning points	Students will either be required to differentiate or use graphical methods to arrive at solutions and relate their calculations to their graphs and vice versa

We have also added "turning points" to the section about determining maxima, minima and stationary points. Again this is a phrase many teachers will have used but it is now one which can appear in examination questions.

SAMS Paper 2 Qu 4

The curve C has the equation $y = 6 - x - 2x^2$

(a) Show that the co-ordinates of the stationary point of C are $\left(-\frac{1}{4}, \quad 6\frac{1}{8}\right)$

(4)

(b) (i) Find the gradient of the curve C at the points where $x = -1$ and $x = 0$

(ii) Hence, or otherwise, explain why the stationary point of C is a maximum.

(2)

Details of content changes

Section 5 Matrices

5 **F**	Transformations of the plane associated with 2×2 matrices	Transformations include: Reflections in the line $x = 0$, $y = 0$ or $x \pm y = 0$ and Rotations about the origin Enlargements with centre at the origin

We have tidied up the notes here so that the transformations referred to are linear transformations that can be represented by matrices and the other, more general transformations have been moved to section 8

e.g. **SAMS Paper 2 Qu 10**
A 7 part 14 mark question similar to questions from 4MB0

5 **G**	Combination of transformations	The matrix **AB** represents the transformation represented by **B** followed by the transformation represented by **A**

There is a new note clarifying the interpretation of the matrix **AB** as a combination of transformations.

Details of content changes

Section 6 Geometry

6 **B**	Geometrical reasoning

There is a new line called “Geometrical reasoning” designed to clarify that we shall continue to sometimes ask candidates to “give reasons” when using geometrical facts e.g. “corresponding angles” or “the alternate segment theorem” etc.

6 **H**	Prove the similarity of two triangles
6 **I**	Congruent shapes
6 **J**	Understand and use SSS, SAS, ASA and RHS conditions to prove the congruence of triangles

There is a new heading "Prove the similarity of two triangles" and another that requires candidates to "Understand and use SSS, SAS, ASA and RHS conditions to prove the congruence of triangles." We already had a heading about congruent shapes but this section will mean we can ask for more formal proofs about congruent triangles.

Example for 6 **I** and 6 **J** on congruent triangles

SAMS Paper 1 Qu 17

ABCD and *DEFG* are squares that are not identical.

Prove that *AE* = *CG*

(4 marks)

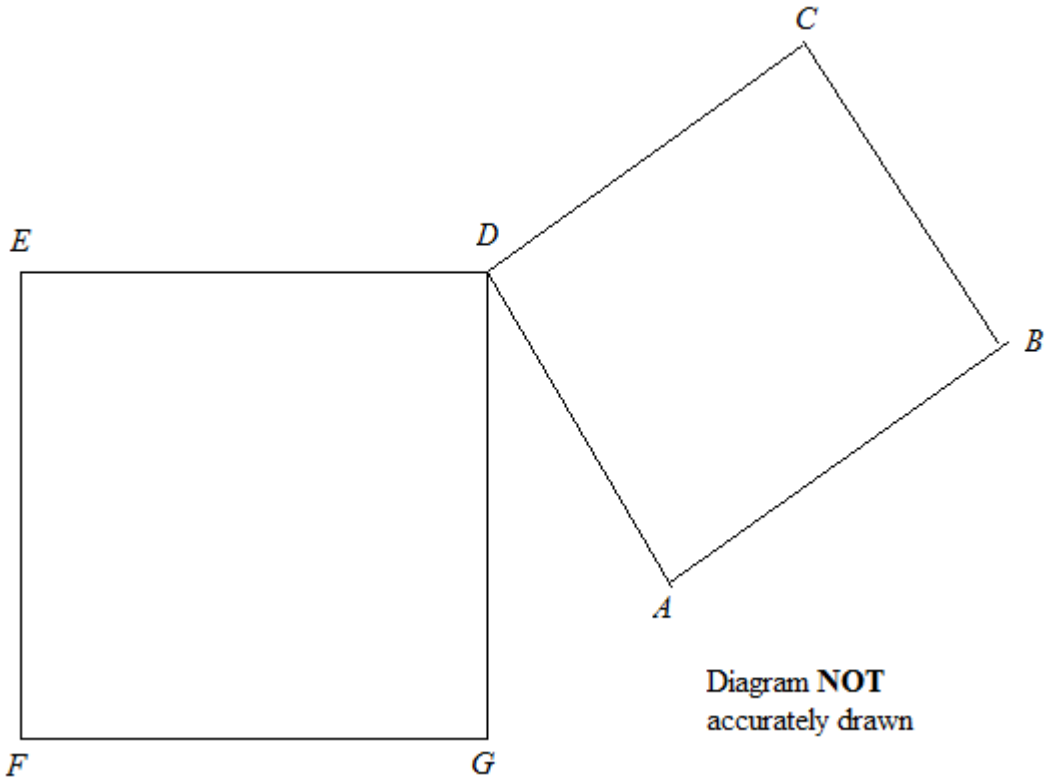


Diagram **NOT** accurately drawn

6 **L**	Properties of a cyclic quadrilateral

We have also added a heading “Properties of a cyclic quadrilateral” to clarify that a knowledge of cyclic quadrilaterals and their properties is included.

Details of content changes

Section 7 Mensuration

7 **C**	Mensuration of the three–dimensional shapes, right circular cylinder, right circular cone and sphere, cuboid, pyramid, prism	Straightforward calculations, where appropriate, of volumes of the shapes mentioned and also of three–dimensional shapes which can be divided into a collection of such shapes (e.g. cone, hemisphere)

There is no new content here but we have amended the notes to clarify that 3D shapes formed from say a cone and a cylinder are included.

Details of content changes

Section 8 Vectors and transformation geometry

Although the heading has been changed to include transformation geometry there is hardly any alteration in the content.

8 **B**	Understand and use vector notation	The notations $\overrightarrow{OA}$ and **a** will be used, as will column vectors

We have added "position vectors" as a term we may use in **8D** and "column vectors" for clarification in **8B**.

8 **L**	Multiplication of a vector by a matrix	To include the finding of a matrix for a given transformation of the plane, using $\begin{pmatrix}1\\0\end{pmatrix}$ and $\begin{pmatrix}0\\1\end{pmatrix}$ These transformations will be those for which the origin is unchanged.

We have added a section to the notes about using the effects of a transformation on the vectors $\begin{pmatrix}1\\0\end{pmatrix}$ and $\begin{pmatrix}0\\1\end{pmatrix}$

to find the matrix representation of this transformation.

8 **J**	Transformations of the plane	Reflections in any line Rotations about any point Translations Enlargements

The only other change involves the listing of transformations of the plane that cannot be represented by a matrix but were expected in the 4MB0 specification e.g. reflections in any line, translations etc.

SAMS Paper 2 Qu 10

A 7 part question worth 14 marks

Details of content changes

Section 9 Trigonometry

- There are no changes to this section

Details of content changes

Section 10 Statistics and Probability

There are a few minor alterations of the wording here to clarify some of the terms and the coverage we expect.

10 **A**	Graphical representation of numerical data	To include bar charts, pie charts and histograms Cumulative frequency graphs are excluded

We now refer to bar charts and pie charts rather than "bar diagrams" and "circular diagrams".

10 **D**	Determination of a modal class and the class containing the median for grouped data

For grouped data we have clarified that we would expect candidates to determine the class containing the median.

They are not expected to estimate the median using interpolation.

10 **I**	Using simple conditional probability for combined events	
10 **J**	Finding very simple conditional probability	The notation P(A|B) will not be used

We have changed the section on conditional probability so that it is clear that candidates are expected to use simple conditional probabilities and also find them.

SAMS Paper 1 Qu 9

A fair 6-sided red dice and a fair 6-sided blue dice are rolled. The score on the red dice and the score on the blue dice are added together to get the total.

Given that the score on the red dice is 1, find the probability that the total is **less than 4**

(2 marks)

Conditional Probability example SAMS Paper 2 Qu 9

Left-handed and right-handed people do a test. It is found that 80% of left-handed people pass the test and 90% of right-handed people pass the test.

On the island of Sinestra, a fraction p of the population are left-handed and the remainder are right-handed.

A person on Sinestra is to be chosen at random to take the test.

(a) Write down the probability, in terms of p, that the person chosen is right-handed. **(1)**

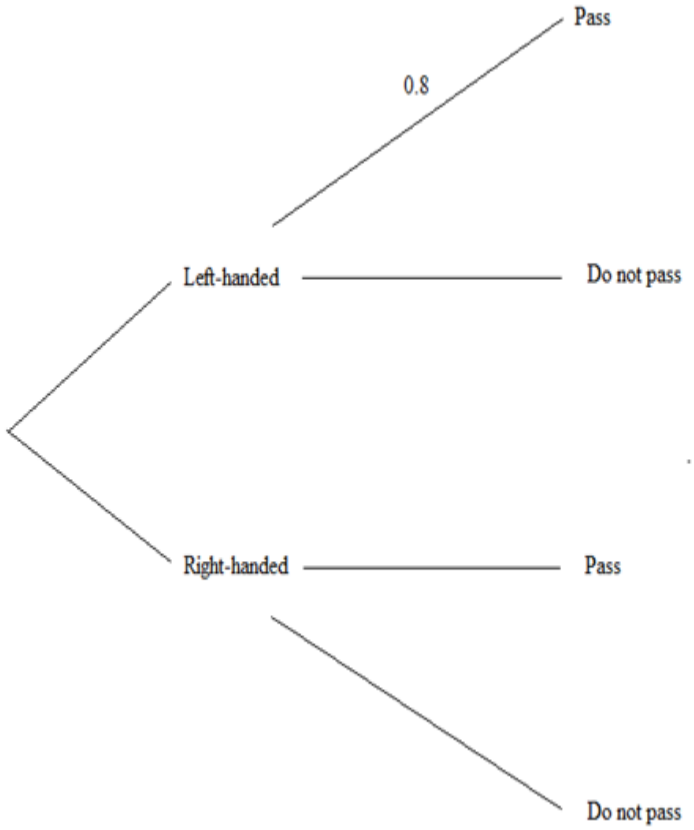
(b) Complete the probability tree diagram to show all the information. **(3)**

On Sinestra the probability of passing the test is 5 times the probability of not passing the test.

(c) From your completed probability tree diagram, or otherwise, find the value of p. **(5)**

A person on Sinestra is selected at random. **Given that** this person passed the test, use your answer to part (c) to

(d) determine the probability that this person is left-handed. **(3)**



10 **K**	Understand and use the term 'expected frequency'

Finally we have added a heading "Understand and use the term expected frequency" to clarify that we might, for example, ask how many times we would expect to get a six if a fair die is rolled 150 times.

SAMS Paper 1 Qu 14

The probability that a train arrives on time at a station is 0.76
Mary has a list of all the trains that are due to arrive at the station on Monday. She picks, at random, a train from this list.

(a) Write down the probability that this train **will not** arrive on time at the station on Monday.

(1)

600 trains arrive at this station on Monday.

(b) Work out an estimate for the number of trains that **do** arrive on time at this station on Monday.

(2)

Problem solving skills

Students need to be able to demonstrate problem solving skills by translating problems in mathematical or non-mathematical contexts into a process or a series of mathematical processes.

Questions requiring problem solving skills

KMA0 May 2014 Paper 1F q11

The cost of an adult ticket to a zoo is $13.50

A teacher buys 4 adult tickets and 24 pupil tickets.

The total cost of the tickets is $270

Work out the cost, in dollars ($), of a ticket for one pupil.

KMA0 May 2014 Paper 4H q21

A sphere has a surface area of 81π cm^2

Work out the volume of the sphere.
Give your answer correct to 3 significant figures.

Reasoning skills

Students need to be able to demonstrate reasoning skills by:

- Making deductions and drawing conclusions from mathematical information.
- Constructing chains of reasoning.
- Presenting arguments and proofs.
- Interpreting and communicating information accurately.

Questions requiring reasoning skills

KMA0 May 2014 Paper 1F q4

Here are the first five terms of a number sequence.

10 14 18 22 26

(a) Write down the next two terms of the sequence.

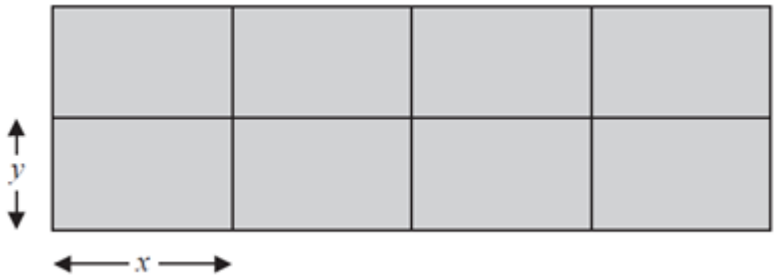
(b) Explain how you worked out your answer.

(c) Find the 12^{th} term of the sequence.

(d) Explain why 100 cannot be a term of the sequence.

KMA0 May 2014 Paper 3H q14

A farmer has 180 metres of fencing.
With the 180 metres of fencing,
he makes an enclosure divided
into eight equal, rectangular pens.



The fencing is used for the perimeter of each pen.

The length of each pen is x metres and the width of each pen is y metres.

(a) (i) Show that $y = 18 - 1.2x$

The total area of the enclosure if A m^2

(ii) Show that $A = 144x - 9.6x^2$

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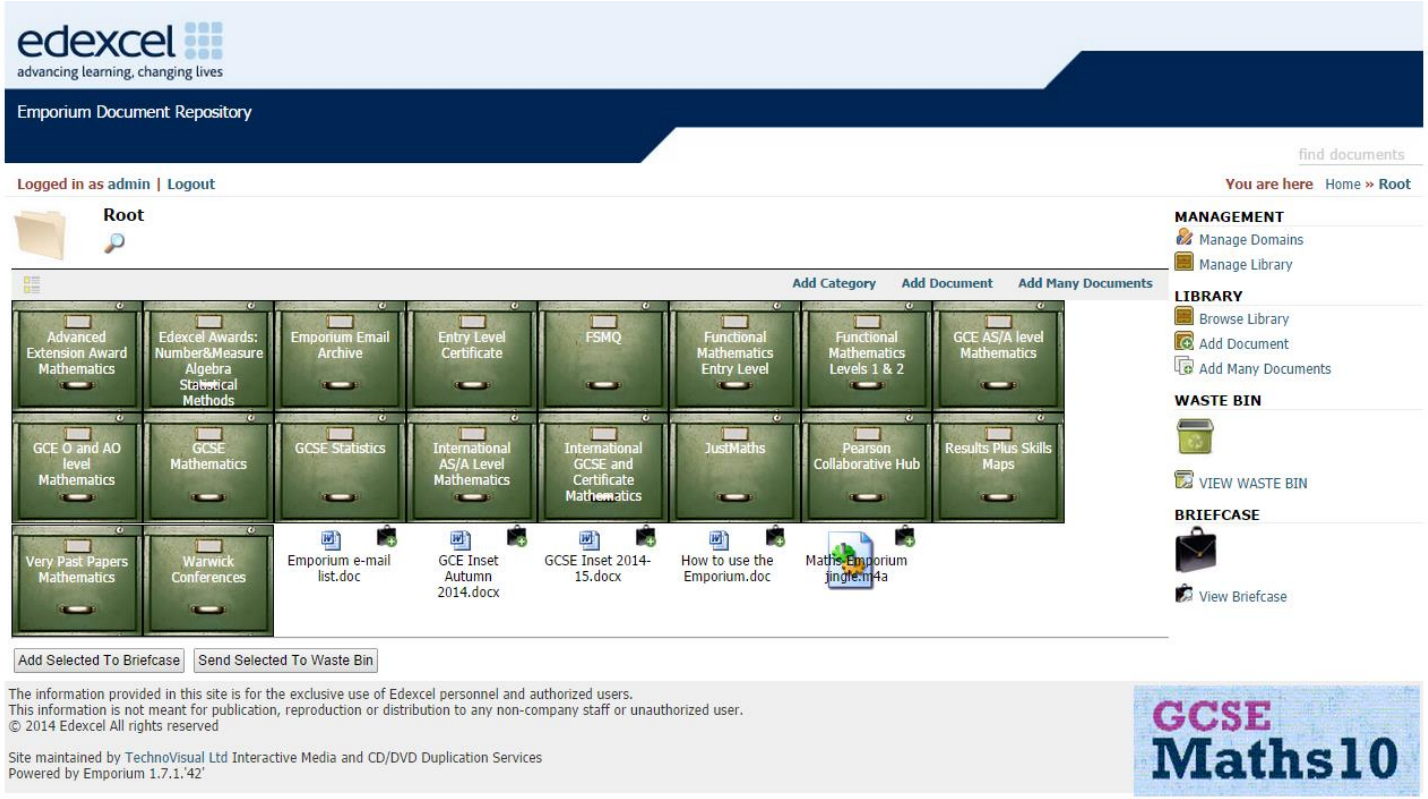
Mathematics Emporium

- Website at www.edexcelmaths.com



- Email updates from mathsemporium@pearson.com

Statistics

If you would like to know more about examination statistics, you may find these links of interest to you.

Examination Results Statistics

www.edexcel.com/iwantto/Pages/stats.aspx

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Also refer to the examiners report which is available for download with other documents.

Statistics continued

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