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Course Title:

Edexcel International GCSE (9-1) Mathematics

Specification A (4MA1)

Launch & getting ready to teach

Event Code: 16IAM04

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

Session Agenda

10.00 Introduction

10.05 Changes to International GCSE Maths, including grading and problem solving

11.30 Break

11:45 Content changes for Foundation tier

12:45 Lunch

13.30 Content changes for Higher tier

14:30 Break

14:45 Grade 9, support and resources

15.30 Finish

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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 have made 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

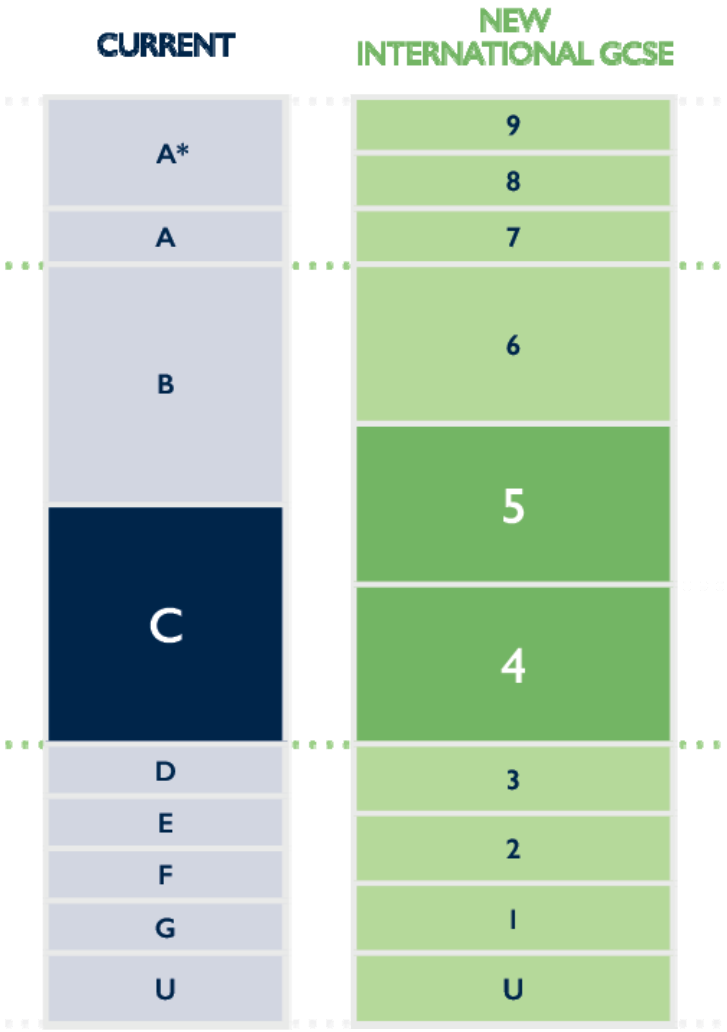
…but…

- 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?

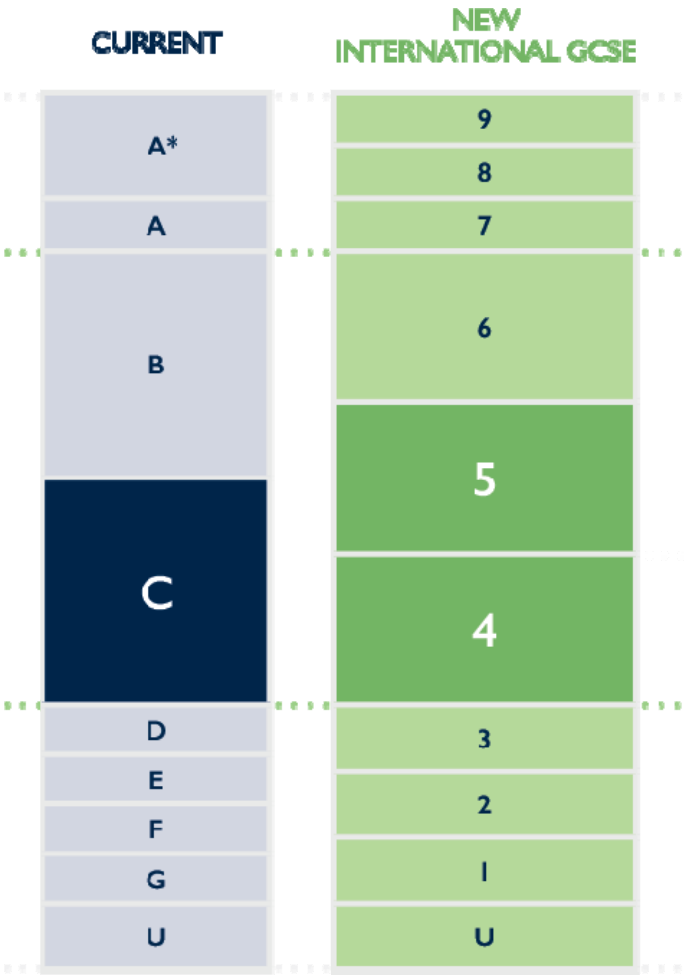
- New grading scale – therefore no direct comparability with old A*-G
- Levels 4 and 5 align to old grade C
- Level 7 aligns to grade A
- Level 8 & 9 align to grade A*
- Level 9 represents a higher level of attainment than A* grade boundary
- Introduced in GCSE in 3 phases 2015-2017
- Introduced into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



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
- Internationally relevant: Grade 5 linked with best available evidence of average PISA performance in high performing countries
- 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

FAQs
http://qualifications.pearson.com/content/dam/pdf/News/general-news/Edexcel-International-GCSE-FAQs-for-international-schools-only.pdf



New 9-1 grading scale (summary)

- The bottom of grade 1 is aligned to the bottom of grade G
- Broadly the same proportion of students will achieve a grade 4 or above as achieve grade C or above
- Grade 5 will be set between grades C and B
- Broadly the same proportion of students will achieve a grade 7 or above as achieve grade A or above
- Grade 9 is for the very highest attainers

Timeline for International GCSE Mathematics (UK or International)

	Sept 2016	Jan 2017	Summer 2017	Jan 2018	Summer 2018
Current specification 4MA0		January series as normal	Summer series as normal	Final assessment	
New specification 4MA1	First teaching				First assessment

New specifications and sample assessment materials for International GCSE (9-1) Mathematics (4MA1) available in spring 2016.

International centres

As other courses will not follow the 9-1 structure until June 2019, our International centres will be able to continue to use International GCSE Mathematics (4MA0) with grades A*-G until this time. This allows for students to have grades as all letters rather than a mix.

Timeline for International GCSE Mathematics (International 2nd option)

	Sept 2017	Jan 2018	Summer 2018	Jan 2019	Summer 2019
Current specification 4MA0		January series as normal	Summer series as normal	Final assessment	
New specification 4MA1	First teaching				First assessment

New specifications and sample assessment materials for International GCSE (9-1) Mathematics (4MA1) available in spring 2016. You can start teaching it in September 2016 or September 2017

Assessment Structure

Foundation tier

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

Higher tier

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%)

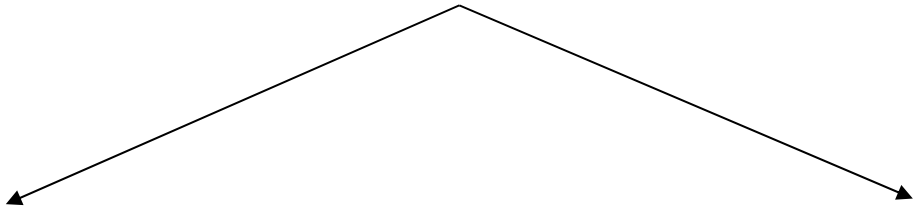
- Statistics and probability

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	Higher
Number : Algebra	Number : Algebra
3 : 2	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

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

(Example targeted at about grade 4)

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.

(Example targeted at about grade 7)

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.

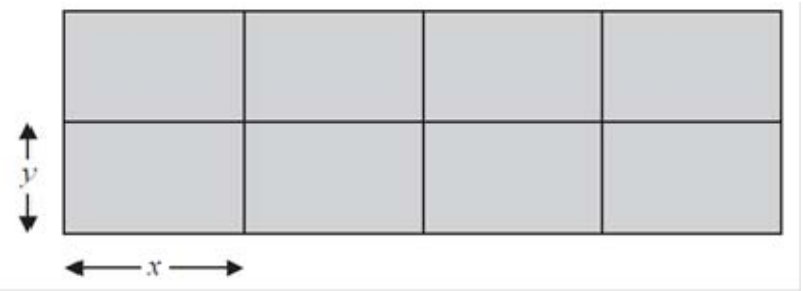
Questions requiring reasoning skills

(Example aimed at grades 6 or 7)
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 wid

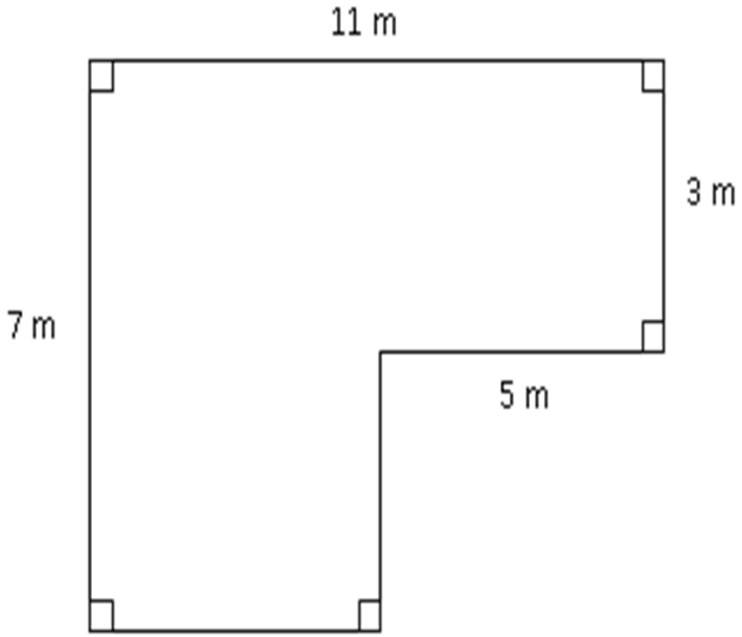
(a) (i) Show that $y = 18 - 1.2x$

The total area of the enclosure if A m²

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



Problem solving



The diagram shows the floor plan of a room in Kate's house.

Kate is going to cover the floor with tiles. She is going to buy some packs of tiles.

The tiles in each pack of tiles cover 2 m^2 of floor. Each pack of tiles costs £24.80

Work out how much it will cost Kate to buy the packs of tiles she needs.

See if you can design a basic mark scheme for this question – worth 5 marks

Mark	Working	Comments
M1	5 × 3 (=15) **or** 7 × (11 – 5)(=42) **or** 11 × 7 (=77) **or** 5×(7-3)(=20) **or** 11×3(=33) **or** (11–5)×(7–3)(=24)	The first method mark is for a correct start to find the area of the floor.
M1	5 × 3 + 7 × (11 – 5)(=57) **or** 11 × 7 − 5×(7–3)(=57) **or** 11 × 3 + (11–5)×(7–3)(=57)	The second method mark is then awarded for a complete method to find area
M1	'57' ÷ 2 (28.5)	The award of this mark depends on the award of at least one previous method mark. As the focus of the problem is on area, students need to be able to show that they understand this and the method to find the area of a rectangle. A common error in problems of this type is for students to use perimeter rather than area.
M1	'29' × 24.8	The final method mark is for both the appreciation that the number of packs of tiles needs to be rounded up to the nearest integer and then multiplied by the cost.
A1	719.20	At the pre-standardisation meeting with examiners, final decisions will be made as to what is acceptable for the answer. The draft mark scheme for this paper shows that, at present, the only acceptable answer is 719.20

Problem solving

a, *b*, *c* and *d* are 4 integers written in order of size, starting with the smallest integer.

The mean of *a*, *b*, *c* and *d* is 15

The sum of *a*, *b* and *c* is 39

(a) Find the value of *d*. (2)

Given also that the range of *a*, *b*, *c* and *d* is 10

(b) Work out the median of *a*, *b*, *c* and *d*. (2)

Suggest a mark scheme for this question – what would you need to think about in part (b)?

	Mark	Working	Comments
(a)	M1	4×15 (=60) **or** $4 \times 15 - 39$ $\frac{a+b+c+d}{4} = 15$	The student needs to show some understanding of how a mean is found in order to gain this mark
	A1	21	
(b)	M1	$d - a = 10$ **or** $a = 11$ **or** $a =$ "21" $- 10$ **or** $b + c = 39 - 11 = 28$	As this part of the question uses the answer from part (a), examiners would be instructed to look at the student's answer to part (a) and follow that through into this part of the question, awarding the first mark for showing an understanding of range
	A1	14	

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 $1 \square a < 10$

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)

Teaching algebra at Foundation tier

- **Background**
  - Number skills involving negative values and brackets
  - Times tables
  - E.g. $3(x + 2) = 3x + 2$ or $3x + 5$
  - $5 - 2(x - 3) = 5 - 2x - 3$ or $3(x - 3)$

- **Conventions**
  - Symbol notation
  - e.g. $3 \times y = 3y$ not $y3$
  - x not $1x$
  - $3x^2$ means square the x then multiply by 2

Teaching algebra at Foundation tier (continued)

- **Misconceptions**
  - If $x = 3$ some may interpret $4x$ as 43
  - Some think they can add x and x^2 terms
    - *If we are aware of the students' misconceptions we are better equipped to help them*

- **Possible Remedies**
  - Use concrete examples e.g. a for the price of an apple, b for the price of a banana. What is the price of 3 apples and 4 bananas?
  - Plenty of practice
  - 5 minute exercises at the start or end of a lesson e.g. $3(2x - 5)$, $(3x)^2$, $(-3)^2$, $5p - 4q - 3p + 2q$ etc

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.

Teaching Simultaneous equations

- Solve $\begin{matrix} 2x + 3y = 14 \\ 4x + \ y = \ 3 \end{matrix}$ How do you do it?

- Elimination: $\begin{matrix} 4x + 6y = 28 \\ 4x + \ y = \ 3 \end{matrix}$ and subtract?

- Substitution: $y = 3 - 4x \quad \Rightarrow \quad 2x + 3(3 - 4x) = 14$

- Substitution can be generalised!

- Make sure candidates going on to Higher tier meet substitution.

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

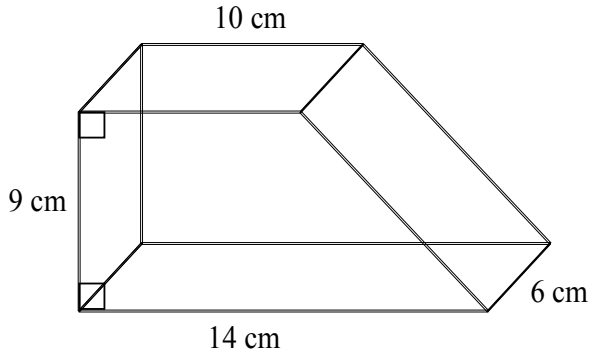


Diagram **NOT** accurately drawn

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

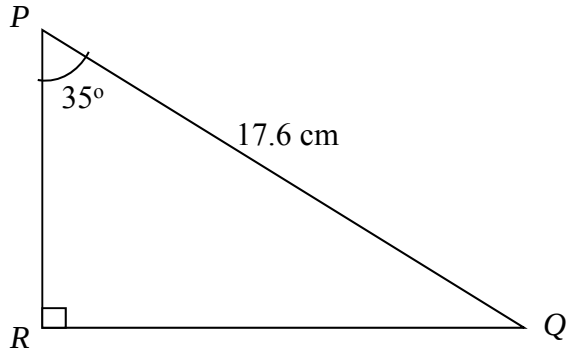
The prism is made from wood with density 0.7 g/cm³

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

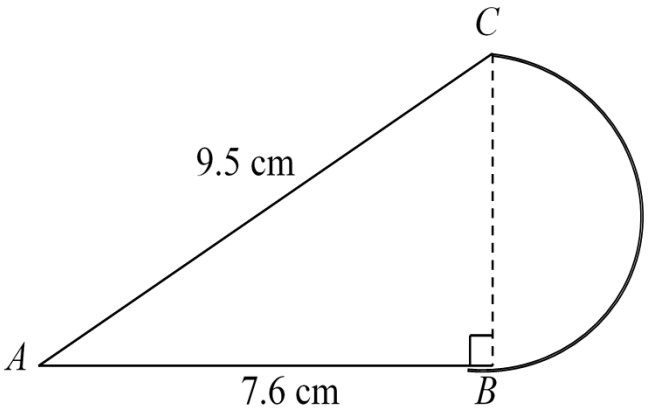


Diagram **NOT** accurately drawn

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.

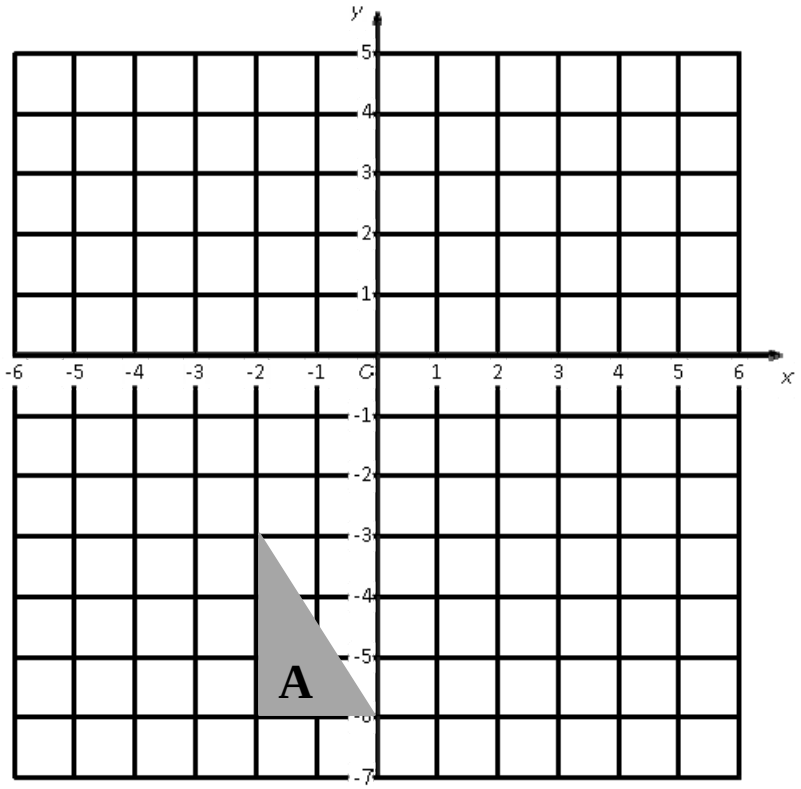
(5)

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



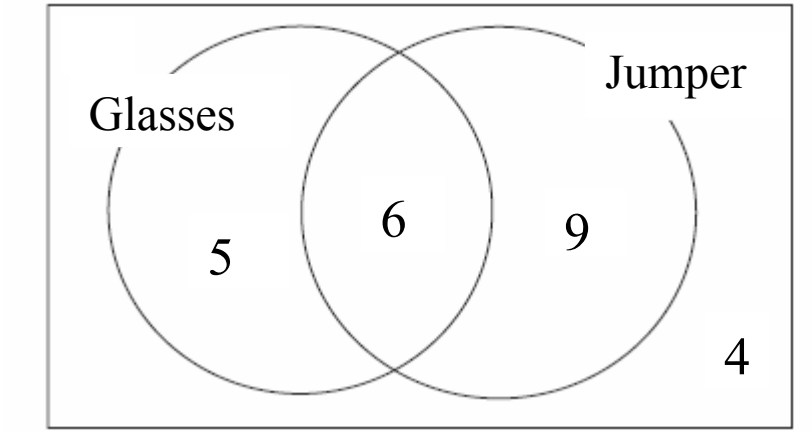
(a) On the grid, translate triangle **A** by the vector $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$

(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)

Teaching surd division

- Make connections with the difference of two squares

- Prepare candidates for “show that” questions:
  - Make sure they write down and show the multiplication by for example $\frac{2+\sqrt{3}}{2+\sqrt{3}}$
  - Put in every step e.g. write $\sqrt{12} \times \sqrt{3}$ not just 6 and don’t just assume that $\sqrt{12} = 2\sqrt{3}$ but write $\sqrt{12} = \sqrt{4 \times 3} = 2\sqrt{3}$

- Prepare candidates for questions using algebra e.g.
  - Given that $\frac{6}{a-\sqrt{b}} = 8 + 2\sqrt{b}$, where a is an integer and *b* is a prime number, find the value of *a* and the value of *b*.

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.

Multiplying out brackets

- Now 2 or more not just two.
- Start with simple “tools” e.g. FOIL, smiley face etc
- E.g. $(x + 5)(x – 3) = x^2 – 3x + 5x – 15$ etc
- **BUT … don’t leave them there!**
- Students now need a method that generalises
- E.g. $(x + 5)(x – 3) = x(x – 3) + 5(x – 3)$ etc

2.5 Proportions

No change in wording but we have added a couple of cases (in red)in the notes. This brings into line with spec B

2.5	**A** set up problems involving direct or inverse 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 $y \propto \sqrt{x}$, $y \propto \frac{1}{\sqrt{x}}$

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)

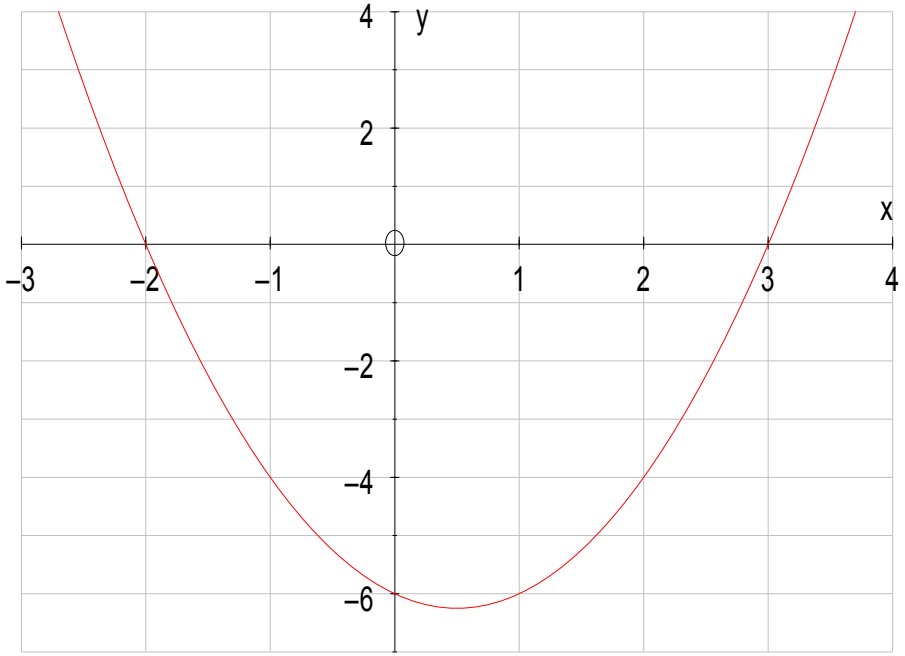
Teaching quadratic inequalities

e.g. $x^2 - x - 6 < 0$

- Find critical values: solve $x^2 - x - 6 = 0$
- $(x - 3)(x + 2) = 0$ so $x = 3$ or -2

- Sketch or table?
- So $-2 < x < 3$

- For $x^2 - x - 6 > 0$
- $x < -2$ or $x > 3$
- **Don't** write $3 < x < -2$



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.

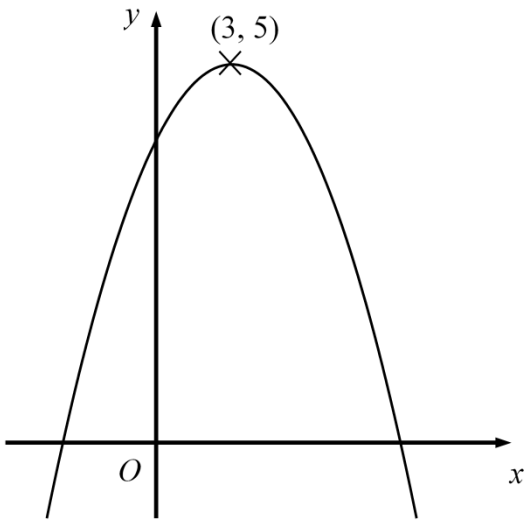
(5)

Arithmetic series

- **Formulae**
  - $t_n = a + (n-1)d$ is **not** given
  - $S_n = \frac{n}{2}[2a + (n-1)d]$ **is** given - proof is not required but it is a "beautiful" piece of mathematics and worth doing even if only in a special case.
- **Question types**
  - Given 3rd term and say 8th term of an arithmetic series ...find *a* and *d* (simultaneous equations)
  - Find the sum of 4 + 7 + 10 + ... + 109 (use the t_n formula to find *n* then the sum formula)
  - Questions in context e.g. I save $10 in week 1 and increase the amount I save each week by $5.
    (a) How much do I save in week 40?
    (b) What is the total amount I have saved after 40 weeks?

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.

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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

Preparing for grade 9

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- Usually multi step
- Mixing of ideas
- Perhaps some problem solving
- Perhaps some mathematical reasoning or proof

Start with a regular decagon…

- **Use the sheet in your pack**
- Discuss with your neighbour…
- What questions could an examiner ask?
- Anything involving proof?
- Anything approaching grade 9?

Possible ideas

- Find the internal angle (grade 4)
- Prove that *AD* is parallel to *BC*
- If side is *x* cm find the area of triangle *BCF*
- Find, in terms of *x*, the radius of the circle through *GABC*
- A point is chosen at random inside the decagon.
- Find the probability that the point is inside the pentagon *ABCDE.*

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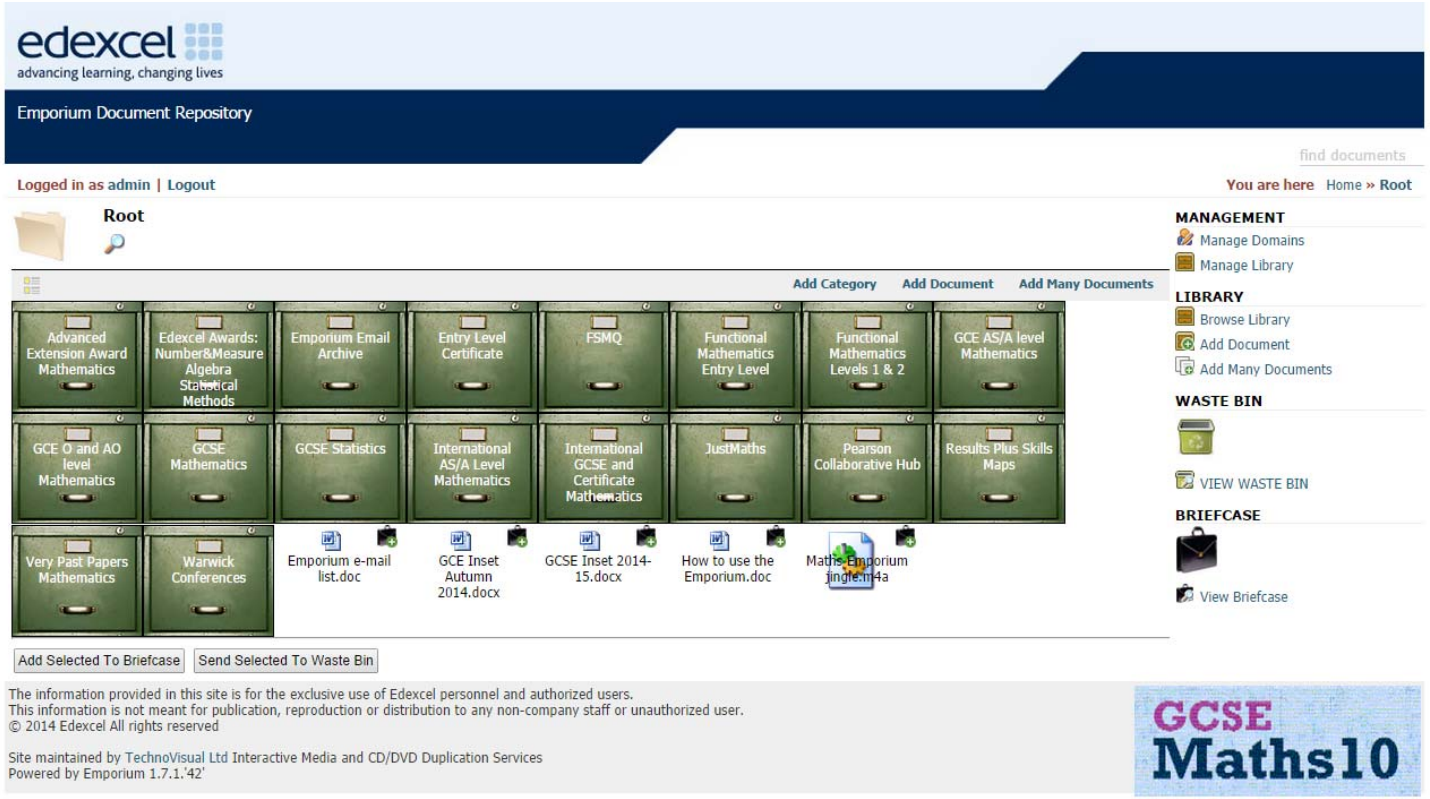
Free support materials for International GCSE Maths (9-1)

- Specification
- Sample Assessment Materials
- Courses from Pearson
- Exam Wizard
- Extra practice questions on the new topics
- Mapping documents between new GCSE (1MA1) and new International GCSE (4MA1)
- Getting Started Guide and Scheme of Work. Copies of these documents are included in your packs.

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

Results statistics summarise the overall grade outcomes of candidates sitting Edexcel examinations.

Grade Boundaries

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

This page shows the minimum marks needed to achieve a certain grade for all UK and international examinations.

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

Statistics continued

ResultsPlus

www.edexcel.com/resultsplus

•Edexcel's free online service giving instant and detailed analysis of your students' exam and mock performance

•see your students' scores for every exam question

•understand how your students' performance compares with Edexcel national averages

Published resources

We are committed to helping teachers deliver our Edexcel qualifications and students to achieve their full potential. To do this, we aim for our qualifications to be supported by a wide range of high-quality resources, produced by a range of publishers. However, it is not necessary to purchase endorsed resources to deliver our qualifications.

Published resources for Edexcel International GCSE (9-1) Maths*

Written for the new **9-1 grading scale**, ensuring a consistent international standard of qualification. Increased levels of grading further supports learners to achieve their full potential and make more informed decisions about their options for progression.

A fully integrated **Progression Map** tool allows quick and easy formative assessment of student progress, linked to guidance on tailored learning solutions, helping students make the best progress they can.

The embedded **21st-century skills** that are needed for progression into higher education and employment are explicitly signposted, allowing students to understand, and engage with, the skills they're gaining.

* You don't have to purchase any resources to deliver our qualifications.

Published resources for Edexcel International GCSE (9-1) Maths

Specifically developed for **International learners,** with appropriate international content, making it engaging and relevant for all learners and allowing for learning in a local context, to a global standard.

EAL-focused content, checked by an EAL specialist, addresses the needs of EAL students with carefully graded writing to B2/C1 level (CEFR) and a glossary provided of specialist Maths vocabulary.

Curriculum matched, endorsed resources* so you can be confident that you are covering the specification, providing your learners with the best chance of succeeding.

Written and developed by popular and **experienced authors**, Turner and Potts, who are also practising classroom teachers.

* Subject to endorsement.

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The new **ActiveLearn Digital Service** brings together your planning, teaching and assessment across one service, saving you valuable time.

- Embeds progression within its interactive activities offering the teacher extra diagnostic power.
- Creates a personalised teaching and independent learning experience both in and outside the classroom.
- Each Student Book will provide access to an **ActiveBook**, a digital version of the Student's Book, which can be accessed online, anytime, anywhere supporting learning beyond the classroom.

Other published resources for Edexcel International GCSE (9-1) Maths*

Hodder

- IGCSE Mathematics for Edexcel, 3rd edition, available this summer.

  Fully revised for the new Spec and question types.

  www.hoddereducation.co.uk

* No paid-for products or services are required to deliver Pearson Edexcel qualifications.

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