PEARSON EDEXCEL INTERNATIONAL GCSE (9-1)

Mathematics A (4MA1)

GETTING READY TO TEACH

Event code: 18IBAM01

First teaching in 2017, first assessment in 2019.

Session Agenda

10:00 Start - introductions

10:10 Changes to International GCSE Mathematics

10.45 Changes to Foundation level

11:15 Coffee

11:35 Resume foundation level with student exemplars

12.30 Lunch

13:30 Continue with Foundation level and begin Higher level

14.45 Tea

15:05 Continue with Higher level and resources, free and paid for.

16:00 Finish

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Aims and Objectives

During the training you will:

- Consider the updated structure, content and assessment of this qualification, and the support available to guide you through these changes
- Explore possible teaching and delivery strategies for the new qualification
- Explore exemplar student work to support your understanding of the mark schemes
- Have the opportunity to network, discuss best practice, take away resources to help with your planning and delivery, and share ideas with other teachers
- Learn about the introduction of the new 9-1 grading scale
- Have dedicated time to ask questions to our trainer.

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About Pearson Edexcel

Pearson is the world's leading learning company. Our mission is to help people make progress in their lives through learning – because we believe that learning opens up opportunities, creating fulfilling careers and better lives.

- **Qualifications**: our qualifications and assessments help to educate millions of people worldwide.
- **Support**: we provide innovative textbooks, curriculum materials, multimedia learning tools, IT platforms, professional development.
- **Impact**: At the core of everything we do is the desire to make a measurable impact on improving people's lives through learning.

Edexcel is part of Pearson Education and is the UK's largest awarding body.

- **Worldwide recognition**: over 150 years of international education experience, more than 3.4 million learners in 70+ countries. Over 9 million scripts marked annually, with exceptionally reliable results.

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International GCSE Features

9-1 grading scale

Awarding

- The grading system is changing, but our commitment to awarding grades that accurately reflect learner exam performance remains the same.
- We set new grade boundaries (minimum number of marks needed to achieve each grade) for each assessment of each qualification.

Benefits

- Greater differentiation across levels of attainment, e.g. 2 grades where the current C grade is.
- Rewards truly outstanding achievement with the grade 9.
- Provides more information about student attainment to help progression to A Level.
- Same scale for Pearson Edexcel GCSE and International GCSE allows for clear comparison with English standards, unlike old A* to G grading.

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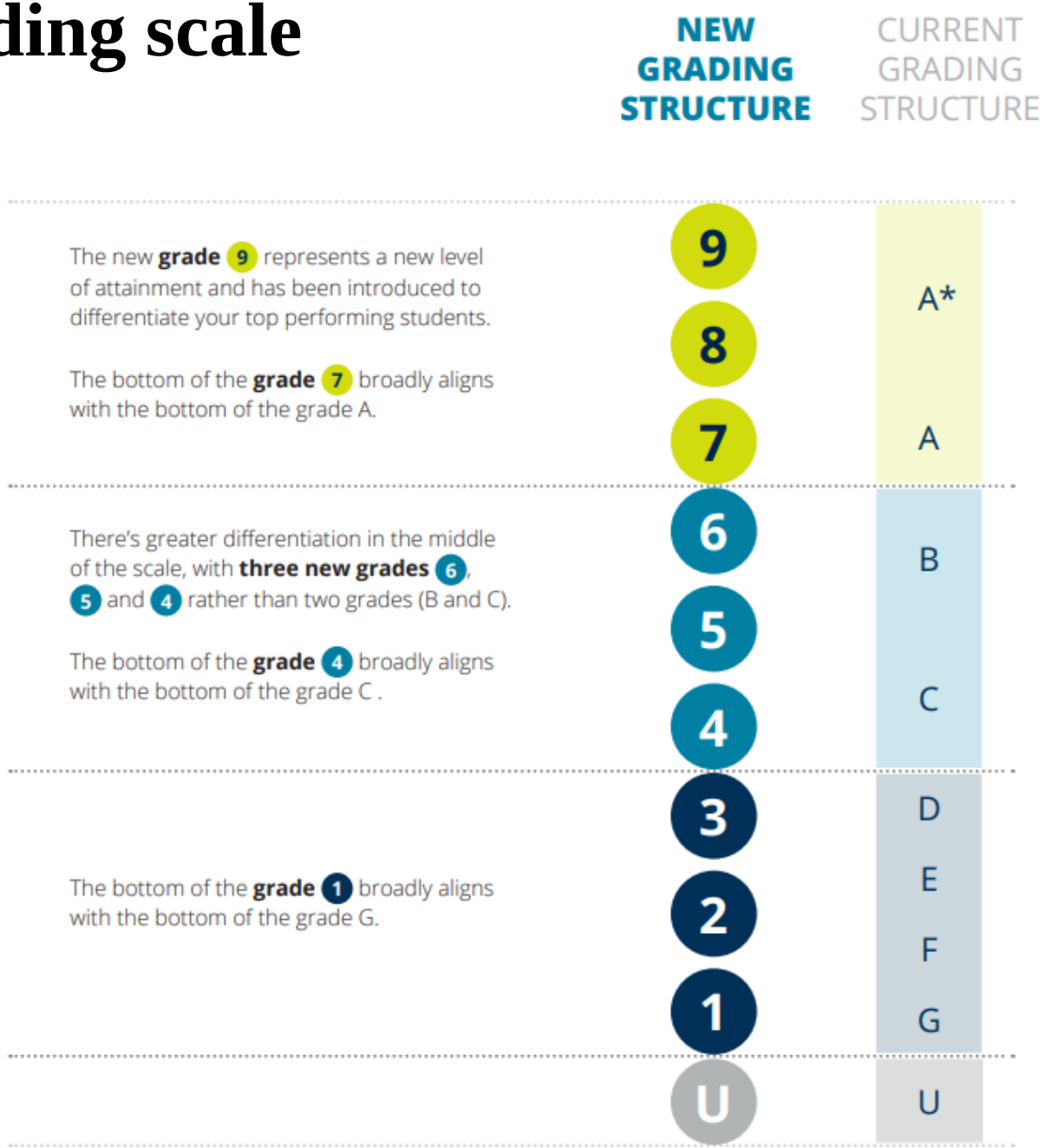
9-1 grading scale



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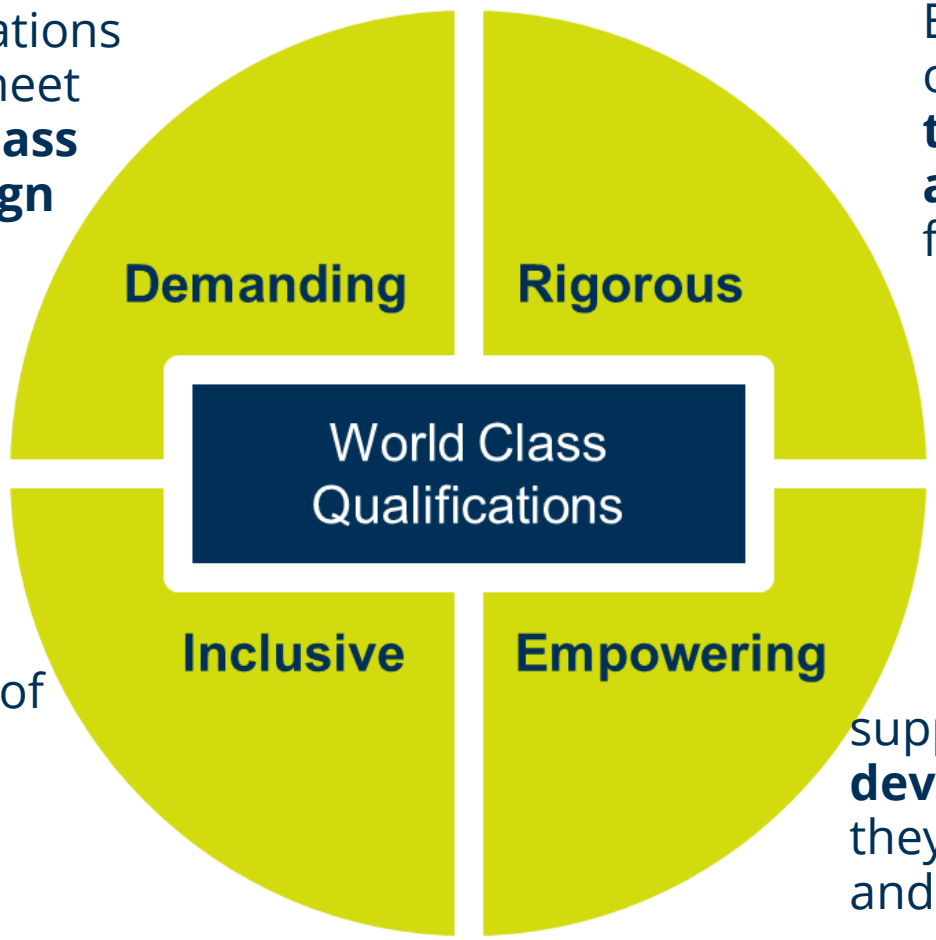
World-class qualifications

All Edexcel qualifications are developed to meet Pearson's **World Class Qualification design principles**



Endorsement of educational **thought-leaders and assessment experts** from across the globe

Developed using an understanding and benchmarking of **all educational systems**

Qualifications that support young people to **develop the capabilities** they need to **progress** and prosper in their lives

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Supporting transferable skills

- Our transferable skills framework underpins the design all Pearson Edexcel international qualifications and their supporting resources across IPLS, International GCSE and International A Level.
- Ensures our assessments target the skills students' need for successful progression.
- Increasing our support where these skills **naturally** occur through the teaching, learning and assessment.
- Pearson materials and mapping will support you in identifying and developing the acquisition of these skills in students across the full curriculum.
- https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/General/Transferable-Skills-Information-Pack.pdf

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4MA1

Assessment Structure

Foundation

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. We expect this to have an effect on the number of Foundation and Higher students.
- 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%)

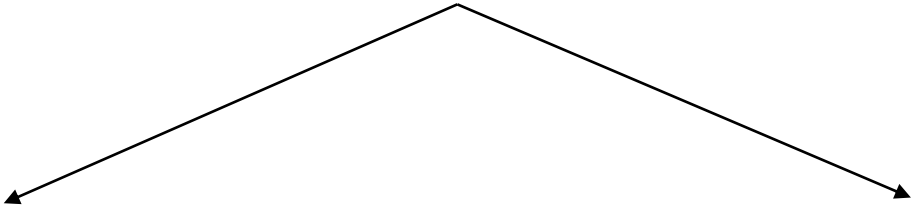
- Statistics and probability

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 for International GCSE	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 level.
- 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 formula sheet; candidates are expected to know them.

Foundation tier

There is new content in the foundation tier - some of this is to accommodate the grade 5 which is now available at this tier.

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Fractions

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)

Powers and roots

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

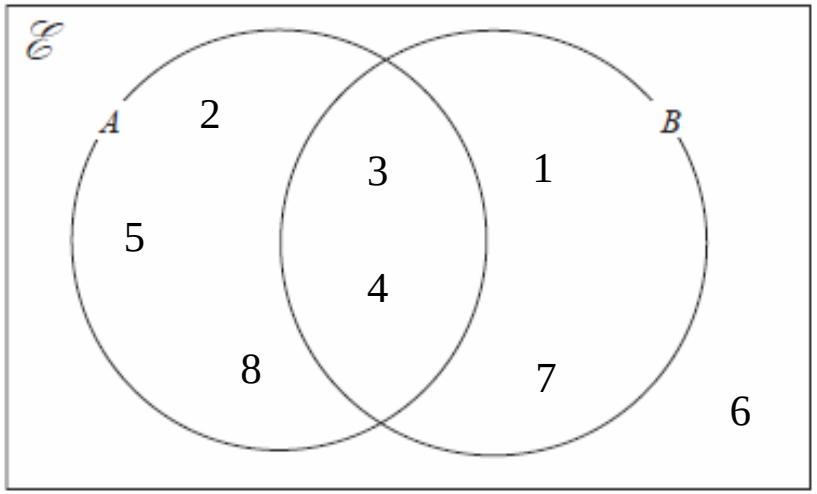
Find the lowest common multiple (LCM) of 20, 30 and 45

(3)

Set language and notation

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

e.g. The Venn diagram shows Universal set and the numbers in the sets A and B.



Write down the members of the sets

(i) A

(ii) B'

Percentages

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)

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)

AO1 Numbers and Algebra		
1.6 Percentages	**G**	use compound interest and depreciation.

Marking
M1 0.02 × 40 000 (=800) or 1.02 × 40 000(=40800) or 2400
M1 for method to find interest for year 2 **and** year 3 "40800" × 0.02 (=816) and "41616" × 0.02 (=832.32) **OR** 2448.32 (**M2** for 40 000 × 1.02^3)
A1 42448.32

Student attempt

8. 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.

40000 x 3 = 120000

2% x 120000 = 2400

40,000 + 2400 = 42,400

HK$ 42,400

(Total for Question 8 is 3 marks)

Marking
M1 0.02 × 40 000 (=800) or 1.02 × 40 000(=40800) or 2400
M1 for method to find interest for year 2 **and** year 3
"40800" × 0.02 (=816) and "41616" × 0.02 (=832.32) **OR** 2448.32
(**M2** for 40 000 × 1.02^3)
A1 42448.32

Student attempt

8. 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.

40000×1.2×1.2×1.2=69120

HK$.....69120.....

(Total for Question 8 is 3 marks)

Marking
M1 0.02 × 40 000 (=800) or 1.02 × 40 000(=40800) or 2400
M1 for method to find interest for year 2 **and** year 3 "40800" × 0.02 (=816) and "41616" × 0.02 (=832.32) **OR** 2448.32 (**M2** for 40 000 × 1.02^3)
A1 42448.32

Student attempt

8. 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.

$\frac{40000}{100} = ? \times 2 = 1$ year 800

40 000 + 800

$\frac{40800}{100} \times 2 : 2$ year = 816

$\frac{41616}{100} + 2 = 832.32$

HK$ 832.32

(Total for Question 8 is 3 marks)

Marking
M1 0.02 × 40 000 (=800) or 1.02 × 40 000(=40800) or 2400
M1 for method to find interest for year 2 **and** year 3 "40800" × 0.02 (=816) and "41616" × 0.02 (=832.32) **OR** 2448.32 (**M2** for 40 000 × 1.02^3)
A1 42448.32

Standard form

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)

Algebraic manipulation

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 $x^2 - 25$

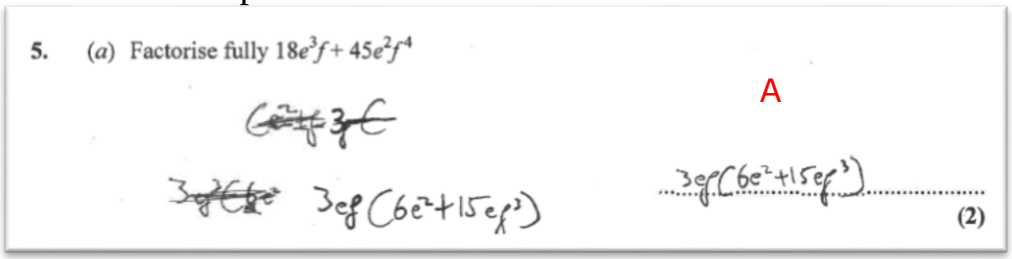
SAMs Paper 1F Q21a / Paper 3H Q6a

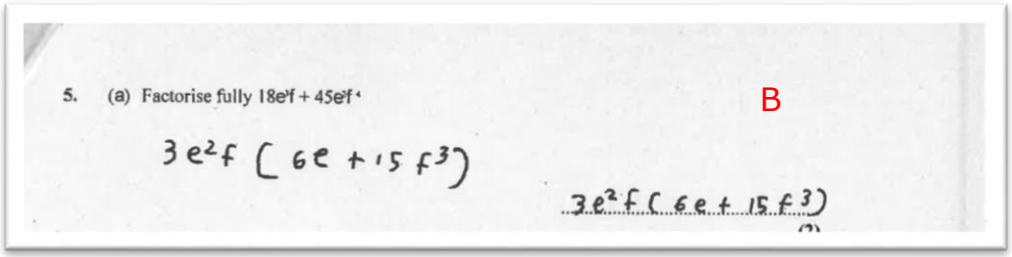
- Factorise fully $18e^3f + 45e^2f^4$

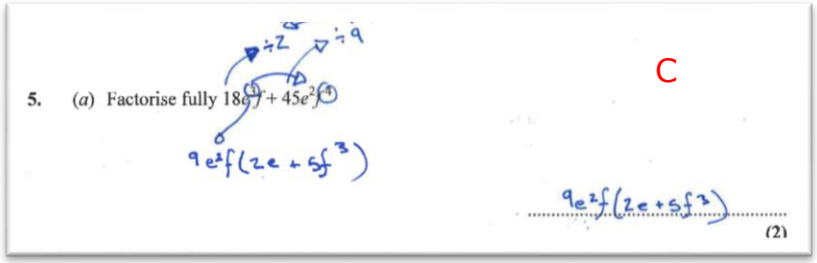
AO1 Numbers and Algebra
2.2 Algebraic manipulation **B** Take out common factors

Marking
M1 Any correct partially factorised expression
A1 fully correct $9e^2f(2e + 5f^3)$

Student attempt







Expressions and formulae

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 $w = 6y^2$

Simultaneous equations

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.

Quadratic equations

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)

SAMs Paper 1F q21b / Paper 3H q6b

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

Show clear algebraic working. **(3)**

AO1 Numbers and Algebra
2.7 Quadratic equations **A** solve quadratic equations by factorisation (limited to $x^2 + bx + c = 0$)

Marking
M1 $(x \pm 6)(x \pm 2)$ or correct substitution into quadratic formula (allow one sign error)
M1 $(x - 6)(x + 2)$ or $\frac{4 \pm \sqrt{64}}{2}$
A1 $6, -2$ dependent on at least M1

Marking

M1 $(x \pm 6)(x \pm 2)$ or correct substitution into quadratic formula (allow one sign error)

M1 $(x - 6)(x + 2)$ or $\frac{4 \pm \sqrt{64}}{2}$

A1 $6, -2$ dependent on at least M1

Student attempt

B

(b) Solve $x^2 - 4x - 12 = 0$
Show clear algebraic working.

$a = 1 \quad b = -4 \quad c = -12$

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$\frac{4 \pm \sqrt{16 - 4(1)(-12)}}{2}$

$\frac{4 \pm \sqrt{-32}}{2}$

A

(b) Solve $x^2 - 4x - 12 = 0$
Show clear algebraic working.

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

$x^2 - x = \frac{12}{4}$

$x - x = \sqrt{\frac{12}{4}}$

$x = \sqrt{\frac{12}{4}}$

$\sqrt{\frac{12}{4}}$

(3)

(Total for Question 5 is 5 marks)

C

(b) Solve $x^2 - 4x - 12 = 0$
Show clear algebraic working.

$(x - 6)(x + 2)$

$(x-6)(x+2)$

(3)

(Total for Question 5 is 5 marks)

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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)

Graphs

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

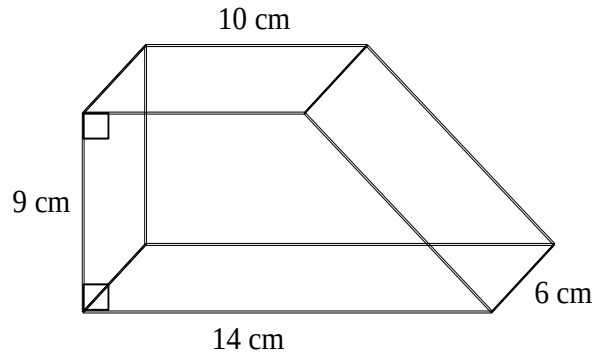


Diagram **NOT** accurately drawn

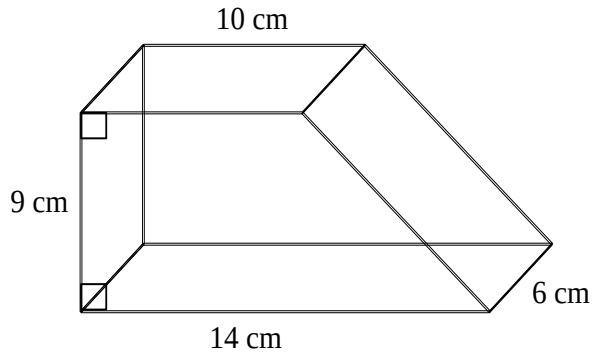
The diagram shows a solid prism.
The cross section of the prism is a trapezium.

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

Work out the mass of the prism.

(4)

SAMs Paper 2F q18 / Paper 4H q3



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)

AO2 Shape, space and measure
4.4 Measures **G** use compound measure such as speed, *density* and pressure

Marking
M1 for area of cross section 0.5 × (10 + 14) × 9 oe (= 108)
M1 volume of prism (dep on previous M1) "108" × 6 (= 648)
M1 "648" × 0.7 (independent)
A1 453.6 (accept 454)

4.

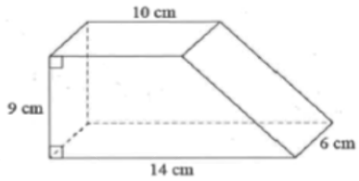


Diagram **NOT** accurately drawn

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.

mass = density × volume

= 0.7 × 108

= 75.6

$\frac{1}{2}(a+b)h$

$\frac{1}{2}(10+14)h$

$\frac{1}{2}(24)h$

= 108

75.6 ..... g

(Total for Question 4 is 4 marks)

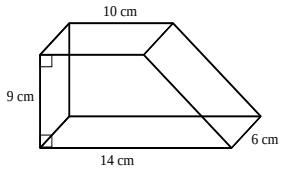
Marking

M1 for area of cross section 0.5 × (10 + 14) × 9 oe (= 108)

M1 volume of prism (dep on previous M1) "108" × 6 (= 648)

M1 "648" × 0.7 (independent)

A1 453.6 (accept 454)



Work out the mass of the prism.

volume = area of cross section × length

mass = $d \times v$

$d = 0.7$

$r = 90 + \frac{45}{2}$

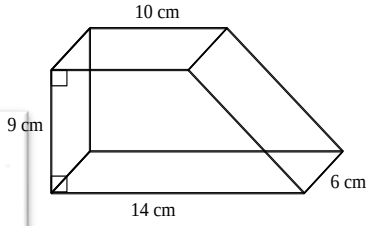
$90 + 22.5$

$= 112.5 \times 14 =$ $1575\ cm^3 \times 0.7\ g/cm^3$

Marking
M1 for area of cross section $0.5 \times (10 + 14) \times 9$ oe (= 108)
M1 volume of prism (dep on previous M1) "108" × 6 (= 648)
M1 "648" × 0.7 (independent)
A1 453.6 (accept 454)

1102.5 ..... g

(Total for Question 4 is 4 marks)



$\frac{1}{2}(a+b)h = 108$

$0.5(10+14)9$

density = $\frac{\text{mass}}{\text{volume}}$

$108 \div 0.7\ g/cm^3$

154

.....g

(Total for Question 4 is 4 marks)

Marking

M1 for area of cross section $0.5 \times (10 + 14) \times 9$ oe (= 108)

M1 volume of prism (dep on previous M1) "108" × 6 (= 648)

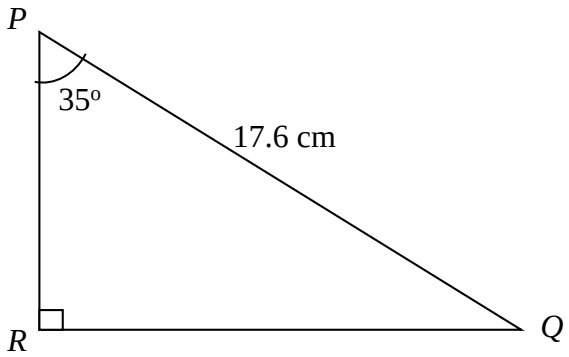
M1 "648" × 0.7 (independent)

A1 453.6 (accept 454)

Geometry and Trigonometry (A02)

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)

Geometry and Trigonometry (A02)

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

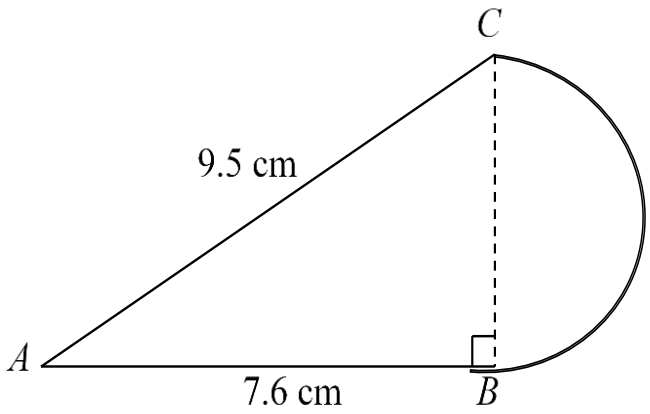


Diagram **NOT** accurately drawn

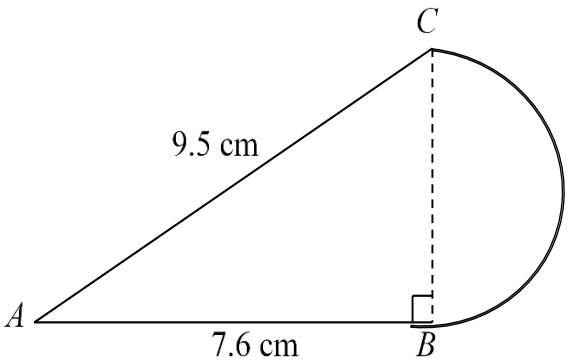
The diagram shows a shape made from triangle *ABC* and a semicircle with diameter *BC*.
Triangle *ABC* is right-angled at *B*.
AB = 7.6 cm and *AC* = 9.5 cm.

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.

SAMs Paper 1F q25 / Paper 3H q10

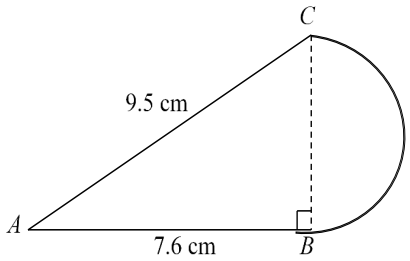


The diagram shows a shape made from triangle *ABC* and a semicircle with diameter *BC*.
Triangle *ABC* is right-angled at *B*.
AB = 7.6 cm and *AC* = 9.5 cm.

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

AO2 Shape, space and measure
4.9 mensuration of 2D shapes **E** …find perimeters and areas of semicircles.

Marking
M1 $\sqrt{9.5^2 - 7.6^2}$ oe
A1 (BC =) 5.7
M1 dep on first M1 for 0.5 × 7.6 × '5.7' **or** 21.6(6) **or** 21.7 oe
M1 0.5 × π × ('5.7'÷ 2) **or** 12.7(587…) **or** 12.8
A1 34.4



$AB = 7.6$ cm and $AC = 9.5$ cm.

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

$a^2 + b^2 = c^2$

$7.6^2 + b^2 = 9.5^2$

$57.76 + b^2 = 90.25$

$b^2 = 90.25 - 57.76$

$b^2 = 32.49$

$b^2 = \sqrt{32.49}$

$b = 5.7$

12.8 ..... cm^2

(Total for Question 10 is 5 marks)

Marking

M1 $\sqrt{9.5^2 - 7.6^2}$ oe

A1 (BC =) 5.7

M1 dep on first M1 for $0.5 \times 7.6 \times$ '5.7' **or** 21.6(6) **or** 21.7 oe

M1 $0.5 \times \pi \times$ ('5.7' ÷ 2) **or** 12.7(587…) **or** 12.8

A1 34.4

Give your answer correct to 3 significant figures.

Pythag. equ. → $a^2 = b^2 + c^2$

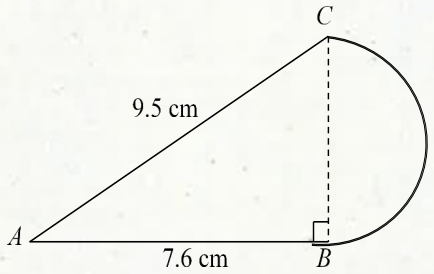
$c^2 - b^2 = a^2$

$\sqrt{c^2 - b^2} = a$

$\sqrt{9.5^2 - 7.6^2} = a$

$a = 5.7$ cm

BC = 5.7 cm



$\frac{5.7}{2} = 2.85$

πr^2

$\pi \times (2.85)^2 = 25.517586$

Area of Semicircle = 25.517586

Area of triangle = $\frac{5.7 \times 7.6}{2} = 21.66$ +

21.66 + 25.517586

47.2 ..... cm²

(Total for Question 10 is 5 marks)

Marking

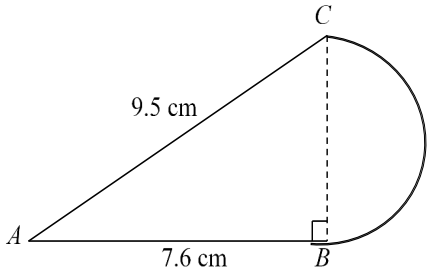
M1 $\sqrt{9.5^2 - 7.6^2}$ oe

A1 (BC =) 5.7

M1 dep on first M1 for 0.5 × 7.6 × '5.7' **or** 21.6(6) **or** 21.7 oe

M1 0.5 × π × ('5.7' ÷ 2) **or** 12.7(587…) **or** 12.8

A1 34.4



$AB = 7.6$ cm and $AC = 9.5$ cm.

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

$9.5^2 - 7.6^2 = c^2$

$90.25 - 57.76 = 32.49$

$\sqrt{32.49} = 5.7$

A of circle $= \pi r^2$ 56.25674504

$= 5.7^2 \pi = 102.070395$

≈ 102 ≈ 56.3

Area of triangle $\frac{1}{2} b \times h$

$= \frac{1}{2} 5.7 \times 9.5 = 27.075 + 56.3$

$= 83.375 \approx 83.4$

~~56.3~~

83.4 ~~102~~ ..... cm^2

(Total for Question 10 is 5 marks)

Marking

M1 $\sqrt{9.5^2 - 7.6^2}$ oe

A1 (BC =) 5.7

M1 dep on first M1 for $0.5 \times 7.6 \times$ '5.7' **or** 21.6(6) **or** 21.7 oe

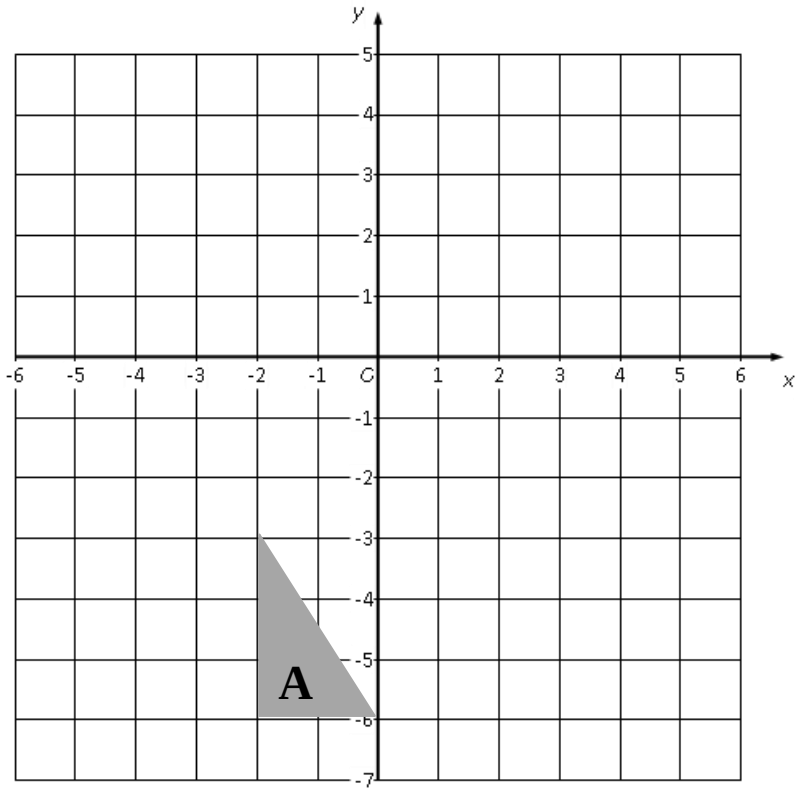
M1 $0.5 \times \pi \times$ ('5.7' ÷ 2) **or** 12.7(587…) **or** 12.8

A1 34.4

Vectors and transformation geometry (A02)

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

SAMs Paper 2F q21 / Paper 4H q6



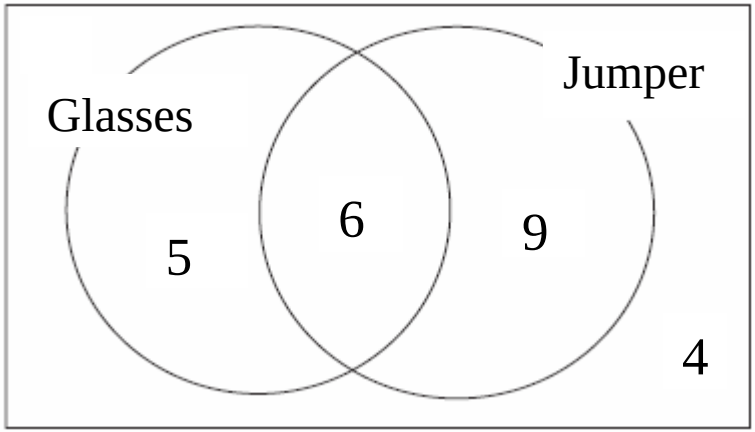
(a) On the grid, translate triangle **A** by the vector $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$

(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

Pearson Edexcel

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)

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.

AO1 Numbers and the number system
1.4 Powers and roots **B** manipulating surds, including rationalising a denominator

Marking
M1 method to rationalise $\dfrac{(\sqrt{12}-1)(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})}$
M1 correct expansion of brackets $\dfrac{2\sqrt{12}-2+\sqrt{12}\sqrt{3}-\sqrt{3}}{4-3}$
B1 $\sqrt{12}=2\sqrt{3}$ (may be seen before expansion)
A1 answer from fully correct working with all steps seen

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

Show your working clearly.

A

$\frac{\sqrt{12}-1}{2-\sqrt{3}} = 4+3\sqrt{3}$

$\sqrt{12}-1 = 4+3\sqrt{3} \times (2-\sqrt{3})$

$\sqrt{12}-1 = 8-4\sqrt{3}+6\sqrt{3}-9$

$\sqrt{12} = -1+2\sqrt{3}$

$2\sqrt{3} = -X+X+2\sqrt{3}$

$2\sqrt{3} = 2\sqrt{3}$

Left side = right side

$\therefore \frac{\sqrt{12}-1}{2-\sqrt{3}}$ can be written as $4+3\sqrt{3}$

$\frac{\sqrt{12}-1}{2-\sqrt{3}}$

$= \frac{2\sqrt{3}-1}{2-\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{6-1}{2-1} = \frac{5}{1}$

$\frac{\sqrt{4\times3}-1}{2-\sqrt{3}}$

(Total for Question 10 is 4 marks)

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

Show your working clearly.

B

$\frac{\sqrt{12}-1}{2-\sqrt{3}}$

$= \frac{\sqrt{12}-1 \times (2+\sqrt{3})}{2-\sqrt{3} \times (2+\sqrt{3})}$

$= \frac{2\sqrt{12}+\sqrt{36}-2-\sqrt{3}}{2^2-3}$

$\frac{2\sqrt{12}+\sqrt{36}-2+\sqrt{3}}{1}$

$= 2\sqrt{4\times3}+6-2-\sqrt{3}$

$= 4\sqrt{3}-\sqrt{3}+4$

$= 3\sqrt{3}+4$

$= 4+3\sqrt{3}$

(Total for Question 10 is 4 marks)

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

Show your working clearly.

C

$\frac{\sqrt{12}-1}{2-\sqrt{3}} = \frac{\sqrt{4\times3}-1}{2-\sqrt{3}} = \frac{2\sqrt{3}-1}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}} = \frac{3\sqrt{3}}{4-\sqrt{3}}$

$= 3\sqrt{3}$

$(2\sqrt{3}-1)(2+\sqrt{3})$

$= 4\sqrt{3}-2+6-\sqrt{3}$

$(2-\sqrt{3})(2+\sqrt{3})$

$= 4-2\sqrt{3}+2\sqrt{3}-\sqrt{3}$

$= 4-\sqrt{3}$

(Total for Question 10 is 4 marks)

Marking

M1 method to rationalise $\frac{(\sqrt{12}-1)(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})}$

M1 correct expansion of brackets $\frac{2\sqrt{12}-2+\sqrt{12}\sqrt{3}-\sqrt{3}}{4-3}$

B1 $\sqrt{12} = 2\sqrt{3}$ (may be seen before expansion)

A1 answer from fully correct working with all steps seen

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

Expand and simplify $(x + 5)(x - 3)(x + 3)$ (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 q21b

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

1MA0 June 2014 Paper 2H Q21b

Prove algebraically that

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

AO1 Number and algebra		
2.2 Algebraic manipulation	**E**	use algebra to support and construct proofs

Marking
M1 for 3 out of 4 terms correct in the expansion of $(2n + 1)^2$ **or** $(2n + 1)((2n+1)^2 - 1)$
A1 $4n^2 + 2n$ or equivalent expression in factorised form
A1 for convincing statement using $2n(2n + 1)$ **or** $2(2n^2 + n)$ **or** $4n^2 + 2n$

6. Prove algebraically that

$$(2n + 1)^2 - (2n + 1) \quad \text{is an even number}$$

for all positive integer values of n.

$(2n+1)^2 = (2n+1)(2n+1)$

$= 4n^2 + 2n + 2n + 1$

$= 4n^2 + 4n + 1$

$4n^2 + 4n + 1 - (2n + 1)$

$4n^2 + 4n + 1 - 2n - 1$

$= 4n^2 + 2n$

any integer will give a positive value if multiplied by 4 or 2

Therefore $4n^2 + 2n$ will always give an even number if n is a positive integer

(Total for Question 6 is 5 marks)

Marking

M1 for 3 out of 4 terms correct in the expansion of $(2n + 1)^2$
or $(2n + 1)((2n+1)^2 - 1)$

A1 $4n^2 + 2n$ or equivalent expression in factorised form

A1 for convincing statement using $2n(2n + 1)$ or $2(2n^2 + n)$ or $4n^2 + 2n$

6. Prove algebraically that

$(2n + 1)^2 - (2n + 1)$ is an even number

for all positive integer values of n.

$2n+1$ = always and odd number

~~$(2n+1)^2 = 4n^2 + 4n + 1$~~

$(2n+1)^2$ = always an odd number

~~$4n^2 + 4n + 1 =$~~

$n > 0$

$\therefore (2n+1)^2 - (2n+1)$

$= 4n^2 + 4n + 1 - 2n - 1$

$= 4n^2 + 2n$ → always an even number

When $n = 1$

$(2 \times 1 + 1)^2 - (2 \times 1 + 1)$

$= (3)^2 - 3$

$= 9 - 3$

$= 6$ → even

when $n = 2$

$(2 \times 2 + 1)^2 - (2 \times 2 + 1)$

$= (5)^2 - 5$

$= 25 - 5$

$= 20$ → even

Marking
M1 for 3 out of 4 terms correct in the expansion of $(2n + 1)^2$ **or** $(2n + 1)((2n+1)^2 - 1)$
A1 $4n^2 + 2n$ or equivalent expression in factorised form
A1 for convincing statement using $2n(2n + 1)$ or $2(2n^2 + n)$ or $4n^2 + 2n$

(Question 6 is 5 marks)

6. Prove algebraically that

$$(2n + 1)^2 - (2n + 1) \quad \text{is an even number}$$

for all positive integer values of n.

even number s $= 2n(n+1)$

$\hookrightarrow (2n+1)(2n+1) = 4n^2 + 4n + 1$

$4n^2 + 4n + 1 - (2n + 1)$

$= 4n^2 + 2n$

$2n(n+1)$

(Total for Question 6 is 5 marks)

Marking
M1 for 3 out of 4 terms correct in the expansion of $(2n + 1)^2$ **or** $(2n + 1)((2n+1)^2 - 1)$
A1 $4n^2 + 2n$ or equivalent expression in factorised form
A1 for convincing statement using $2n(2n + 1)$ or $2(2n^2 + n)$ or $4n^2 + 2n$

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 $y \propto \sqrt{x}$, $y \propto \frac{1}{\sqrt{x}}$

Quadratic equations

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)

Marking
(a) M1 $2(x^2 - 4x) + 9$ or $2(x^2 - 4x + 9/2)$
M1 $2((x - 2)^2 - 2^2) + 9$
A1 $2(x - 2)^2 + 1$
(b) **B1** Explanation e.g. because minimum is at (2, 1)

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

$2x^2 - 8x + 9$

$a(x+b)^2 + c$

$2(x^2 - 4x + \frac{9}{2})$

$(x-2)^2$

$x^2 - 4x + 4$

$-4 + \frac{9}{2} = -\frac{1}{2}$

$2(x-2)^2 + \frac{1}{2}$

$a(x+b)^2 + c$

$2(x-2)^2 + \frac{1}{2}$

(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.

It does not intersect the y as it a reciprical curve. ✗

(1)

(Total for Question 8 is 4 marks)

Marking
(a) M1 $2(x^2 - 4x) + 9$ or $2(x^2 - 4x + 9/2)$
M1 $2((x - 2)^2 - 2^2) + 9$
A1 $2(x - 2)^2 + 1$
(b) **B1** Explanation e.g. because minimum is at (2, 1)

Marking
(a) M1 $2(x^2 - 4x) + 9$ or $2(x^2 - 4x + 9/2)$
M1 $2((x-2)^2 - 2^2) + 9$
A1 $2(x-2)^2 + 1$
(b) **B1** Explanation e.g. because minimum is at (2, 1)

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

$2x^2 - 8x + 9 = 2(x^2 - 4x) + 9$

$x^2 - 4x \Rightarrow (x-2)(x-2)$ $= (x-2)^2$

$= x^2 - 4x + 4 + 2 = +8$

$9 = 4 + c$

$c = 9 - 4$

$c = 1$

$2x^2 - 8x + 9 = 2(x-2)^2 + 1$

$2(x-2)^2 + 1$

(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.

As it has a y translation of +1, this means the graph is moved upwards by 1 from where it would intersect the x axis.

(1)

(Total for Question 8 is 4 marks)

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

$2[x^2 - 4x] + 9$

$2[(x-2)^2 - 4] + 9$

$2(x-2)^2 - 8 + 9$

$2(x-2)^2 + 1$

$2(x-2)^2+1$

(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.

Minimum point on the graph is (2, 1)

(1)

(Total for Question 8 is 4 marks)

Marking
(a) M1 $2(x^2 - 4x) + 9$ or $2(x^2 - 4x + 9/2)$
M1 $2((x-2)^2 - 2^2) + 9$
A1 $2(x-2)^2 + 1$
(b) **B1** Explanation e.g. because minimum is at (2, 1)

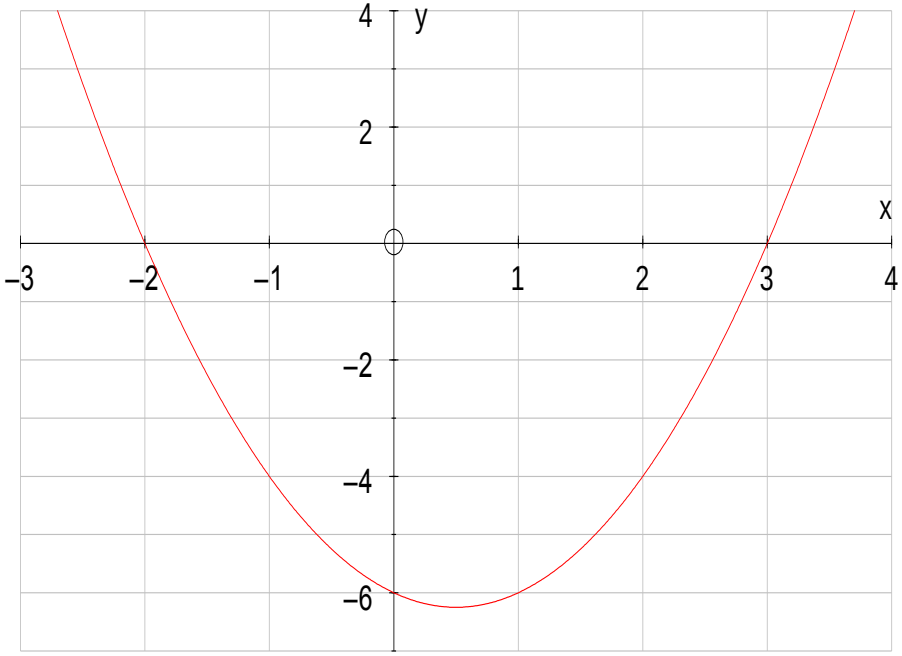
Teaching quadratic inequalities

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(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?

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)

3.1 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)

Marking
M1 for a + 3d = 17 **and** a + 9d = 35 **or** 35 − 17 = 6d
A1 d = 3
A1 a = 8 (ft from d = 3)
M1 for 50/2(2 x '8'+(50 − 1) × '3') oe
A1 4075

9. 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.

$S_n = \frac{n}{2}[2a + (n-1)d]$

$S_{50} = 25[2a + 49d]$

$S_n = a + (n-1)d$

$S_4 = a + 3d$

$17 = a + 3d$

$S_5 = a + 9d$

$35 = a + 9d$

$35 = a + 9d$

$-\ 17 = a + 3d$

$18 = 6d$

$d = 3$

$a = 17 - 9$

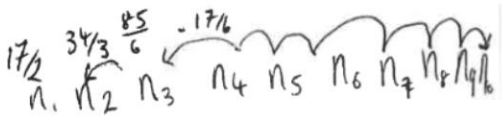
$= 8$

$S_{50} = 25[16 + 147]$

$= 4075$

(Total for Question 9 is 5 marks)

Marking
M1 for a + 3d = 17 **and** a + 9d = 35 **or** 35 − 17 = 6d
A1 d = 3
A1 a = 8 (ft from d = 3)
M1 for 50/2(2 x '8'+(50 − 1) × '3') oe
A1 4075



9. 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.

$n = 50$

$d = \frac{35-17}{6} = \frac{17}{6}$

$a = 8.5$

$n_4 = 17 \quad n_{10} = 35$

$S_n = \frac{n}{2}[2a + (n-1)d]$

$S_n = 25\left[17 + (49) \times \frac{17}{6}\right]$

$= 3895.83 \simeq 3900$

(Total for Question 9 is 5 marks)

Marking
M1 for a + 3d = 17 **and** a + 9d = 35 **or** 35 − 17 = 6d
A1 d = 3
A1 a = 8 (ft from d = 3)
M1 for 50/2(2 × '8'+(50 − 1) × '3') oe
A1 4075

9. 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.

4^{th} $\quad n=4 \quad =17$

$n=10 \quad =35 \qquad 35-17=18 \div 6=3$

$a=5, \; d=3, \; n=50$ $\qquad$ $n=50$

$S=\frac{n}{2}\times[2a+(n-1)\times d]$

$S=\frac{50}{2}\times[2\times 5+(50-1)\times 3]$

$S=25\times[10+147]$

$S=3925$

3, 6, 9, $\quad d=3$

$3\times 4=12$

$17-12=5$

$\therefore a=5$

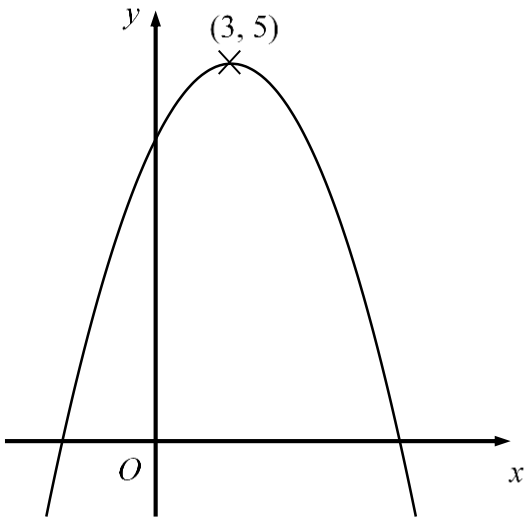
(Total for Question 9 is 5 marks)

Marking
M1 for a + 3d = 17 **and** a + 9d = 35 **or** 35 − 17 = 6d
A1 d = 3
A1 a = 8 (ft from d = 3)
M1 for 50/2(2 x '8'+(50 − 1) × '3') oe
A1 4075

Graphs

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: $y = \sin x$, $y = \cos$, $y = \tan x$ 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)

A good way for students to explain this is to give the two gradients and then show that they multiply to make −1 and explain that this means the lines are perpendicular, e.g.

3. Line $\mathbf{L_1}$ has equation $y = 3x + 5$
Line $\mathbf{L_2}$ has equation $6y + 2x = 1$

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

$y = 3x + 5$ $\quad m^1 = 3$

$6y + 2x = 1$

$6y = 1 - 2x$

$y = \frac{1}{6} - \frac{1}{3}x$ $\quad m^2 = -\frac{1}{3}$

perpendicular lines:
The gradient multiplied gives -1

$m^1 \times m^2 = -1$

$3 \times -\frac{1}{3} = -1$

Therefor they are Perpendicular

(Total for Question 3 is 2 marks)

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Calculus

3.4 Calculus	**D** Now includes a reference to stationary points

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 formula 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

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 (e.g. angles questions requiring reasons)
- 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.

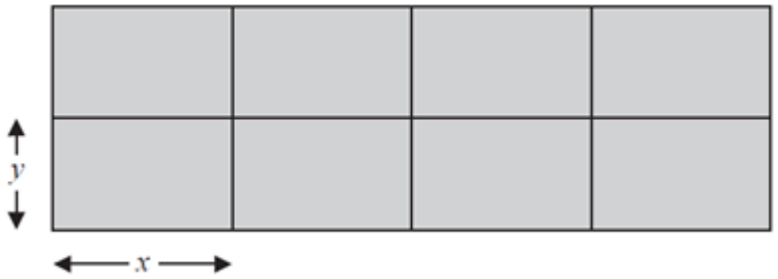
(b) Explain how you worked out your answer.

(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 $y = 18 - 1.2x$

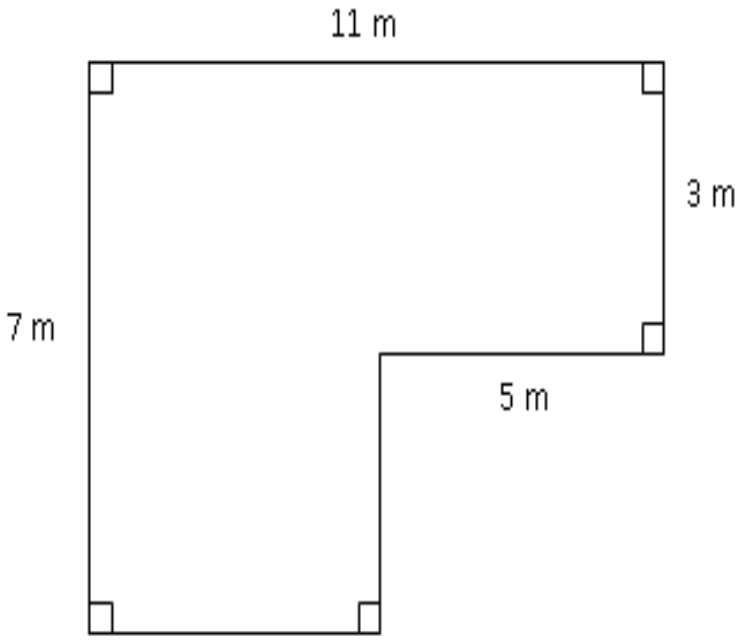
The total area of the enclosure if A m^2

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

Preparing for grade 9

- Usually multi step (but with no structure)
- Mixing of ideas
- Perhaps some problem solving
- Perhaps some mathematical reasoning or proof

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 m² 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

A suggestion

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)?

A suggestion

	Mark	Working	Comments
(a)	M1	4×15 (=60) **or** $4 \times 15 - 39$	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	

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.*

Considering Delivery Strategies and sharing best practice

1. Teaching Strategies.
2. Resources.
3. Technology.

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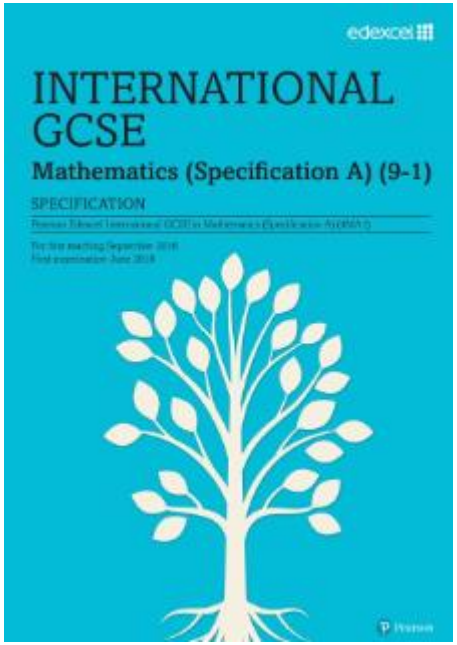
Subject Features



Reviewed and updated in light of UK GCSE changes	Tiered papers	3 Assessment Objectives covering clearly defined topics
Formula Sheet provided in paper	Transferable Skills embedded	Dedicated textbooks are currently in production
	TeachingMaths@Pearson.com	

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Support overview for International GCSE in Maths

Getting Started Guide & Scheme of Work	Getting Ready to Teach Events	Subject interpretation of transferable skills
Subject Advisor	Results Plus	Regional Support Manager
Curriculum Matched Publishing	Exemplar Marked Responses	Additional SAMs
Exam Wizard	Lesson Plans	Topic booklets

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examWizard

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- Questions tagged against unit, topic and assessment objective or simply choose a whole past paper.
- Use existing mark schemes for accurate marking.
- Use examiner report for insight.
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Contact your dedicated Subject Advisor

Subject Advisor details

Your subject advisor is **Graham Cumming**
Phone: **+44 (0)20 7010 2174**
Twitter: **@EmporiumMaths**
Email: TeachingMaths@pearson.com

Sign up for monthly newsletters from Graham to stay on top of qualification updates, training, course materials and industry news.

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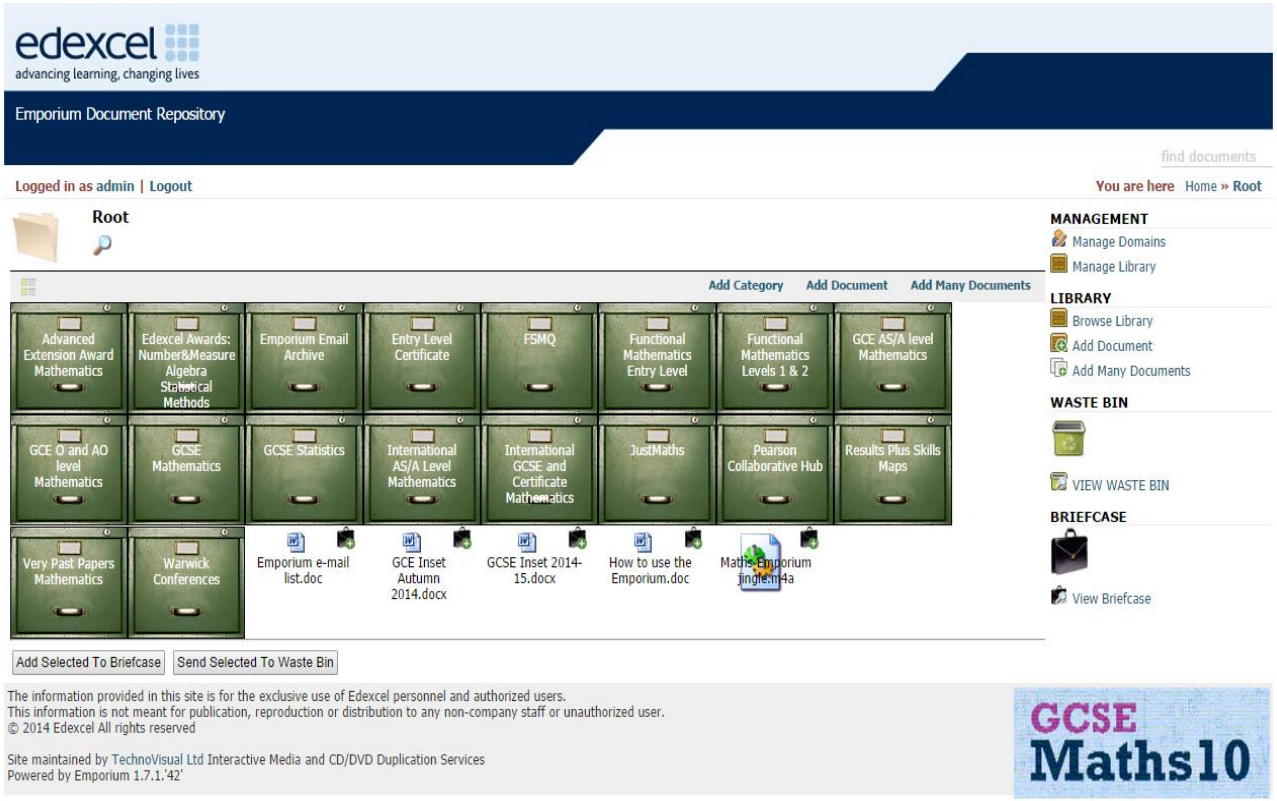

- Email updates from mathsemporium@pearson.com

Other useful links

1. **Grade Boundaries**

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.

2. **Examination Results Statistics**

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

3. **Progress to University**

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4. **Access to scripts**

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