Version 1.0

General Certificate of Secondary Education
Practice Paper 2

Methods in Mathematics (Pilot) 9365

Unit 2 Higher Tier 93652

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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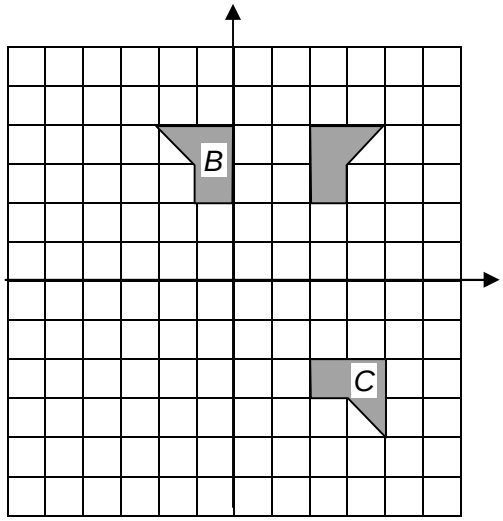
Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
Q	Marks awarded for quality of written communication. (QWC)
M Dep	A method mark dependent on a previous method mark being awarded.
B Dep	A mark that can only be awarded if a previous independent mark has been awarded.
ft	Follow through marks. Marks awarded following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
oe	Or equivalent. Accept answers that are equivalent. eg, accept 0.5 as well as $\frac{1}{2}$

M2 Higher Tier

Q	Answer	Mark	Comments
1	$5x - 2x = 5 + 7$	M1	Allow one sign or rearrangement error
	$3x = 12$	A1	
	4	A1ft	ft on one error only
2	$\pi \times 6.5^2$	M1	$\pi \times 13^2$
	132.6 to 132.75	A1	
	mm^2	B1	
3(a)	3 : 4	B2	B1 Any correct ratio using whole numbers
3(b)	4 : 5.5	M2	
	8 : 11	A1	
Alt 3(b)	9 × 4 × 6 or 9 × 5.5 × 6	M1	
	216 : 297	M1	
	8 : 11	A1	
4(a)	0, 3, 8	B2	B1 For –1, 0, 3 or any two correct
4(b)	$6n$	B1	
	$6n - 1$	B1 Dep	
4(c)	Either ticked and 2 examples, one using an even value of n and one using an odd value of n	B2	B1 Either ticked and a partial explanation or one example only
5	Abe 9th January Baz 2nd January Clara 26th March	B3	B2 For 2 conditions B1 For 1 condition

Q	Answer	Mark	Comments
6	The shaded part of Venn diagram P represents the 16 students who are taking A level mathematics The shaded part of Venn diagram Q represents the 6 students who are girls who do **not** take A level mathematics The shaded part of Venn diagram R represents the 8 students who are boys who do **not** take A level mathematics	B3	B3 For 5 values / letters correct B2 For 4 values / letters correct B1 For 3 values / letters correct
7(a)/(b)		B2 B2	B1 For reflection in $y = 1$ B1 For rotation 90° anti-clockwise about (0, 0)

Q	Answer	Mark	Comments
***8**	Σ(all angles) = 360	M1	oe
	$13x - 4$ (= 360)	A1	
	(x =) 28	A1	
	Substituting in to find the values of the angles or adding three terms	M1	
	84, 96, 106, 74 **and** BD	A1	
	Setting up an equation = 360 and stating 180° make a straight line	Q1	Strand (ii)
Alt 1 8	Checks *AC*: $6x + 2 = 7x - 6$	M1, A1	
	=> $x = 8$	A1	
	$6x + 2 = 6 \times 8 + 2 = 50°$ not 180°	M1	
	So *BD*	A1	
	Setting up an equation = 360 and stating 180° make a straight line	Q1	Strand (ii)
Alt 2 8	Checks *BD*: $7x - 16 = 6x + 12$	M1, A1	
	=> $x = 28$	A1	
	$7x - 6 = 7 \times 28 - 6 = 180$	M1	
	So *BD*	A1	
	Setting up an equation = 360 and stating 180° make a straight line	Q1	Strand (ii)
9	35 000	B1	
	35 000 ÷ 40 000 (×100)	M1	
	87.5	A1	
Alt 9	5000 ÷ 40 000 (= 0.125)	M1	
	1 – 0.125 (= 0.875)	M1	
	87.5	A1	
10(a)	$2x - 10$	B1	
10(b)	$x^2 + 3x + 3x + 9$	M1	Allow a sign error. Must have a term in x^2, two terms in x and a constant term.

	$x^2 + 6x + 9$	A1	
10(c)	$x^2 - 3x - 10 = 0$	M1	
	$(x \pm a)(x \pm b)$	M1 Dep	$ab = \pm 10$
	$(x - 5)(x + 2)$	A1	
	5 or – 2	A1	

11	Sight of tan	M1	
	$\tan^{-1}(13 \div 21)$	M1 Dep	$\tan x = 13 \div 21$
	31.8, 31.76, 31.759…	A1	32 with working

***12**	Enlarge(ment)	Q1	Strand (i)
	Scale factor 0.5 Centre (0, 4)	B2	B1 If 1 fact missing or incorrect

***13**	2 : 8 or 1 : 4	B1	oe using any relevant pair of similar triangles, ie *AEX* : *ADC* (1 : 5), *AEX* : *CFX*, *CXF* : *CAB* (4 ; 5)
	12 ÷ 5	M1	
	2.4 × 4 or 12 – 2.4	M1	
	9.6	A1	
	Use of a clearly identified pair of similar triangles and the correct ratios	Q1	Strand (iii)

14	$7^2 + 9^2 - 2 \times 7 \times 9 \times \cos 42$	M1	
	36.36	A1	
	6.03	A1	6 with working

Q	Answer	Mark	Comments
15	$n^2 + (n + 2)^2$	M1	
	$n^2 + n^2 + 4n + 4$	A1	
	$2n^2 + 4n + 2 + 2$	M1	$2(n^2 + 2n + 1) + 2$
	$2(n + 1)^2 + 2$	A1	
Alt 15	Using $(n - 1)$, n and $(n + 1)$	M1	
	$(n - 1)^2 + (n + 1)^2$	M1	
	$n^2 - 2n + 1 + n^2 + 2n + 1$	A1	
	$2n^2 + 2$	M1	
16	20×12 (= 240)	M1	
	Their $240 \div 12.5$ (= 19.2)	M1	
	Their $19.2 - 12.5$	M1	
	6.7	A1	
17	$\pi \times r \times l + \pi \times r^2$	M1	
	$2 \times \pi \times r^2 + 2\pi r \times r$	M1	$4\pi \times r^2$
	$4\pi r^2 = \pi rl + \pi r^2$	M1	
	$l = 3r$	A1	Condone $r = l \div 3$
18	$3(4x^2 - 12x + 5) \div 3(4x^2 - 1)$	M1	Cancelling by 3
	$(2x - 1)(2x - 5)$	M1	
	$(2x - 1)(2x + 1)$	M1	
	$\frac{2x - 5}{2x + 1}$	A1	If incorrect further work do not award.

Q	Answer	Mark	Comments
19(a)	$AB = \mathbf{b} - \mathbf{a}$	B1	
	$\frac{1}{5}\mathbf{a} + \frac{2}{5}(\mathbf{b} - \mathbf{a})$	M1	
	$\frac{2}{5}\mathbf{b} + (\frac{1}{5} - \frac{2}{5})\mathbf{a}$	A1	Must show expansion and combination of fractions
19(b)	$QR = \frac{3}{5}(\mathbf{b} - \mathbf{a}) + \frac{3}{5}\mathbf{b} = \frac{6}{5}\mathbf{b} - \frac{3}{5}\mathbf{a}$	M1	
	$QR = 3(\frac{1}{5}\mathbf{a} + \frac{2}{5}\mathbf{b})$	A1	
	QR is a multiple of PQ with common point Q	A1	
Alt 19(b)	$PR = -\frac{1}{5}\mathbf{a} + \frac{2}{5}(\mathbf{b} - \mathbf{a})$	M1	
	$PR = 4 \times (\frac{2}{5}\mathbf{b} - \mathbf{a})$ $= 4(-\frac{1}{5}\mathbf{a} + \frac{2}{5}\mathbf{b})$	A1	
	PR is a multiple of PQ with common point P	A1	