Version 0.1

General Certificate Secondary of Education January 2012

Methods in Mathematics (Pilot) 9365

Unit 2 Higher Tier 93652H

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.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334). Registered address: AQA, Devas Street, Manchester M15 6EX

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**	Sight of 0.925 or 92.5%	B1	
	632 × their 0.925	M1	**NB** $632 \times \frac{92.5}{100}$ is B1, M1
	584.60	Q1	584.6 is Q0
Alt *1	632 × 7.5 ÷ 100 (= 47.4)	M1	oe
	632 – their 47.4	M1	
	584.60	Q1	584.6 is Q0
2(a)	$5x + 35$	B1	
2(b)	$3(x - 4)$	B1	
2(c)	$15x + 6 - 8x + 4$	M1, A1	Allow one sign or arithmetic error for M1 A1 If expansion correct.
	$7x + 10$	A1 ft	ft If M1 awarded
3	$\frac{1}{2} \times 8 \times (14 + 17)$	M1	Condone invisible bracket $14 \times 8 + \frac{1}{2} \times 3 \times 8$
	124	A1	
4	2 4 1	B3	B2 If 2 correct B1 If 1 correct
***5**	Shows or states that area is enclosed by a 10 by 6 rectangle less 4 squares	B1	oe Accept an outline drawn on diagram
	Shows or states that the area encloses a 24 full squares	B1	oe Accept an outline drawn on diagram
	Gives a full explanation using both facts above that the area is enclosed by two sets of full squares	Q1	Strand ii - Q0 for partial explanation

Q	Answer	Mark	Comments
6(a)	1.36997 …	B1	
6(b)	1.37	B1 ft	ft Their answer to (a)
7(a)	Odd × odd = odd or if even number airmail would be even number or the amount spent is an odd number or it ends in a 7 or it ends in an odd number	B1	
7(b)	$4x \times 42 + x \times 73 = 4097$	M1	
	$241x = 4097$	M1	
	Airmail 17, First class 68	A1	
8(a)	4	B1	oe
8(b)(i)	Equal sides 2 lines symmetry	B1	Any valid unique reason
8(b)(ii)	No lines of symmetry Diagonals do not cross at right angles	B1	Any valid unique reason
8(b)(iii)	No rotational symmetry Opposite angles not equal Only one line of symmetry	B1	Any valid unique reason
9(a)	$9x - 5x$ **or** $2 + 3$	M1	
	$4x = 5$	A1	
	1.25	A1 ft	oe ft If M1 awarded
9(b)	$\frac{4}{y} = 11 - 3$	M1	$\frac{4}{y} = 14$
	$4 = 8y$	A1	oe
	0.5	A1	oe SC2 $\frac{2}{7}$ (must be equivalent to $\frac{2}{7}$) 0.286, 0.2857 …

Q	Answer	Mark	Comments
10	$3x - 2$ or $2(x - 3)$	B1	
	$3x - 2 = 2(x - 3)$	M1	**NB** $3x - 2 = 2x - 3$ is M2, A0
	$3x - 2 = 2x - 6$	A1	
	-4	A1	
11(a)	$5n$	B1	
	$5n + 1$	B1 Dep	$n5 + 1$ is B1
11(b)	Second difference 2	M1	
	8, 11, 14, 17, 20, …	M1	Subtracting n^2 from each term
	$n^2 + 3n$	A1	
	$n^2 + 3n + 5$	A1 Dep	5 is dependent on $3n$ SC2 n^2 after second difference of 2
12	$\pi \times 6.5 \times (2 \div 2)$	M1	$\pi \times 13 \div 2$
	20.41 to 20.423	A1	6.5π oe
	33.4 to 33.423	A1	$6.5\pi + 13$ SC1 $13\pi + 13 = 53.82$ to 53.846 SC1 $3.25\pi + 13 = 23.205$ to 23.2115
13(a)	$2 \times 3 \times 7$	B1	oe
13(b)	$2^2 \times 3^2 \times 5 \times 7$	M1	
	1260	A1	

Q	Answer	Mark	Comments
14	(reflection in) x-axis	B1	oe Award if qualified with a rotation with some correct properties
	(rotation of) 90 acw	B1 Dep	oe
	(about) (0, –6)	B1 Dep	
Alt 14	(reflection in) y-axis	B1	oe Award if qualified with a rotation with some correct properties
	(rotation of) 90 cw	B1 Dep	oe
	(about) (–6, 0)	B1 Dep	
15(a)	$38^2 - 23^2$	M1	$x^2 + 23^2 = 38^2$
	$\sqrt{915}$	M1 Dep	Must show or take a square root
	30.25, 30.2, 30.248 …	A1	Accept 30 with working
15(b)	Sight of tan	M1	
	tan $x = 17 \div 11$	M1 Dep	
	57, 57.1, 57.09 …	A1	
16(a)	75	B1	
	Angle at centre twice angle at circumference	B1	oe Accept origin for centre and edge for circumference.
16(b)	Angle $BCA = 42$ as Isosceles	B1	These 3 angles are essential and need to be calculated at some stage Penalise the first omission of a reason but allow lack of reasons thereafter
	Angle $ADC = 84$ as cyclic quad	B1	
	Angle $DCA = 54$ alternate segment	B1	
	$BCD + ADC = 180$	B1	
	AD parallel to BC (as interior angles)	Q1	Strand (iii)

Q	Answer	Mark	Comments
17(a)	$9 : 6 = 3 : 2$	M1	$50 \div 15 \times 9$
	$50 = 30 : 20$	A1	$3\frac{1}{3} \times 9 = 30$
17(b)	Linear scale factor $\frac{3}{5}$	M1	
	Area scale factor $\frac{9}{25}$	A1	
	18	A1	
18	$5(2x + 1) - 2(2x - 1)$	M1	Condone invisible or missing brackets
	$= 2(2x - 1)(2x + 1)$	M1	
	$10x + 5 - 4x + 2 = 8x^2 - 2$	A1	$6x + 7 = 8x^2 - 2$
	$8x^2 - 6x - 9 = 0$	M1 Dep	M1 For rearranging their expansion into a 3 term quadratic = 0
	$(4x + 3)(2x - 3) = 0$	M1	Attempt to solve their quadratic by any means
	-0.75 and 1.5	A1 ft	oe ft Their quadratic if all Ms awarded
19	$\frac{AB}{\sin 35} = \frac{100}{\sin 115}$ or $\frac{AC}{\sin 30} = \frac{100}{\sin 115}$	M1	
	$AB = \frac{100 \times \sin 35}{\sin 115}$ or $AC = \frac{100 \times \sin 30}{\sin 115}$	A1	
	$AC = 55.168\ldots$ or $AB = 63.29\ldots$	A1	
	$w = 63.29 \times \sin 30$ or $w = 55.168 \times \sin 35$	M1	
	31.6 to 31.65	A1	