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Mark Scheme (Results)

Summer 2013

International GCSE Mathematics (4MA0) Paper 2FR

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme.
- Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- **Types of mark**
  - M marks: method marks
  - A marks: accuracy marks
  - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
  - awrt – answers which round to.....
  - cao – correct answer only

- ft – follow through
- isw – ignore subsequent working
- SC - special case
- oe – or equivalent (and appropriate)
- dep – dependent
- indep – independent
- eeoo – each error or omission

- **No working**

  If no working is shown then correct answers normally score full marks

  If no working is shown then incorrect (even though nearly correct) answers score no marks.

- **With working**

  If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

  If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.

  Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks.

  If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

  If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

  If there is no answer on the answer line then check the working for an obvious answer.

- **Ignoring subsequent work**

  It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.

  It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- **Parts of questions**
  Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

Apart from Question 22 (where the mark scheme states otherwise) the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question Number	Working	Answer	Mark	Notes
1 (a)		9012	1	B1
(b)(i)		1209 1902 2091 2109 2901	5	B1
(ii)		two thousand and ninety one		B1 Accept 2 for 'two' and 1 for 'one'. Condone omission of 'and'.
(iii)		1902		B1
(iv)		2091 2109		B1 in either order
(v)		693		B1 Accept −693
				Total 6 marks
2 (a)		12	1	B1 cao
(b)		6	1	B1 cao
(c)		Egypt	1	B1 Condone spelling errors
(d)			1	B1 for 2 complete symbol + 1 incomplete symbol < ½
(e)	20 ÷ 5 (4) or 3 × 20 (60)		2	M1 for 20 ÷ 5 (4) or 3 × 20 (60)
		12		A1 cao
				Total 6 marks
3 (a)(i)		chord	2	B1
		segment		B1
(b)		clear attempt to draw a tangent	1	B1
				Total 3 marks
4 (a)		8.35	1	B1 cao
(b)		8.32	1	B1 cao
(c)(i)		clear indication between 8.36 & 8.37 nearer 8.37 than 8.36	3	B1

	(ii)		hundredths		B1	Also accept $\frac{1}{100}$, 0.01, 6 hundredths, $\frac{6}{100}$, 0.06
	(iii)		8		B1	
						Total 5 marks

5	(a)		486	1	B1	cao
	(b)		eg multiply by 3	1	B1	
						Total 2 marks

6	(a)		rhombus	1	B1	
	(b)(i)		48	2	B1	Accept 46-50 inc
	(ii)		acute		B1	
	(c)	5.3 × 4 oe		2	M1	Accept 5.1 – 5.5 instead of 5.3
			21.2		A1	Accept 20.4 – 22
						Total 5 marks

7	(a)		78	1	B1	cao
	(b)	eg $\frac{22}{100}\times 41$, $\frac{22}{100}\times 41\,000\,000$		2	M1	
			9		A1	Also accept 9.0, 9.02, 9 000 000, 9 020 000
	(c)		0.06	1	B1	Accept .06
						Total 4 marks

8	(a)		7	1	B1	cao
	(b)	$3y = 1 - 7$ or $3y = -6$		2	M1	
			-2		A1	cao
						Total 3 marks

9	(a)		$\frac{1}{10}$	1	B1	

(b)		1	1	B1	Accept $\frac{10}{10}$ or $\frac{1}{1}$	Penalise only first occurrence of incorrect notation.
(c)		$\frac{7}{10}$	2	M1 A1	for fraction with a denominator of 10 for $\frac{7}{10}$	
(d)		$\frac{6}{10} + \frac{3}{10}$ oe	2	M1		
		$\frac{9}{10}$		A1		
						Total 6 marks

10 (a)(i)		(4, 5)	2	B1	cao	
(ii)		(2, −1)		B1	cao	
(b)(i)		x at (7, 4)	2	M1	Allow $\pm$ 2 mm Condone omission of label	
(ii)		rectangle drawn		A1	dep on M1	
(c)		2	1	B1		
(d)		(3, 2)	2	B2	B1 for 3 B1 for 2	
					Total 7 marks	

11	12 × 7		2	M1	
		84		A1	cao
					Total 2 marks

12 (a)		27	1	B1	cao
(b)(i)		21.952	2	B1	
(ii)		21.95		B1	ft from (i) if 3 or more dp
(c)(i)	$\frac{83}{0.49}$		3	M1	for 0.49 seen
		169.3877551		A1	Accept 1 or more dp rounded or truncated

(ii)		170		B1	ft from (i) if 1 or more dp	
					Total 6 marks	

13	opposite angle is 109°		3	M1	May be stated or marked on diagram	Alternatively M2 for 180 − 109
	$\frac{360-2\times109}{2}$			M1		
		71		A1		
					Total 3 marks	

14	(a)	6 × 2 + 5 × 3 or 12 + 15		2	M1	for correct substitution
			27		A1	cao
	(b)	6 × (−5 + 2) or 6 × −3 or -30 + 12		2	M1	for correct substitution with × sign or for correct evaluation of brackets
			−18		A1	cao
					Total 4 marks	

15	(a)	$\frac{12}{20}$		2	M1	for $\frac{12}{20}$ or $\frac{6}{10}$
			$\frac{3}{5}$		A1	cao
	(b)	12 : 8 oe		2	M1	
			1.5 oe		A1	
					Total 4 marks	

16		translation	2	B1	Also accept translated, translate etc	These marks are independent but award no marks if the answer is not a single transformation
	2 to the left and 1 up or $\begin{pmatrix}-2\\1\end{pmatrix}$			B1		
					Total 2 marks	

17 (a)	$\frac{50}{2}$ **or** 25 **or** $\frac{51}{2}$ or 25.5 **or** list of all scores		2	M1		
		6		A1	cao	
(b)(i)	3 × 2 + 4 × 5 + 5 × 14 + 6 × 19 + 7 × 10 **or** 6 + 20 + 70 + 114 + 70 **or** 280		3	M1	for sum of products condone 1 error	
	"280" ÷ 50			M1	(dep) for division by 50	
		5.6		A1	cao Also accept 6 if both method marks scored and 5 following 5.6	
(ii)		5	1	B1	ft from their (b)(i)	
					Total 6 marks	

18 (a)(i)	$\frac{15}{100} \times 280$ **or** 42		6	M1		M2 for $\frac{85}{100} \times 280$
	280 – "42"			M1	dep	
		238		A1	cao	
(ii)	$\frac{24}{0.15}$ **or** $24 \times \frac{100}{15}$			M2	for $\frac{24}{0.15}$ or $24 \times \frac{100}{15}$ M1 for $\frac{24}{15}$ or 1.6	
		160		A1	cao	
(b)	2 + 3 **or** 5		3	M1	5 may be denominator of a fraction or coefficient in an equation such as $5x = 320$	
	$\frac{320}{5}$ **or** 320 ÷ "5" **or** 64 **or** $\frac{7}{5}$ oe			M1	dep	
		448		A1	Also award for 128 : 192 : 448	
					Total 9 marks	

19	(a)(i)	$\angle ABC = 68°$ **or** $\angle BCD = 112°$		4	M1	May be stated or marked on diagram
			68		A1	cao
	(ii)	360 − (67 + 112 + "68" + 74)			M1	
			39		A1	ft from their (a)(i) Award 2 marks if the answer to (ii) is 107 – answer to (i)
	(b)	(5 − 2) × 180 **or** 3 × 180 **or** (2 × 5 − 4) × 90 **or** 6 × 90 **or** 360 + 180 **or** (180−67) + (180−112) + (180−"68") + (180−74) + (180−"39") **or** 113 + 68 + 112 + 106 + 141		2	M1	Condone 1 incorrect interior angle
			540		A1	Cao SC B1 for 108
						Total 6 marks
20	(i)		$-1 \leq x < 3$	4	B2	B1 or either $-1 \leq x$ or for $x < 3$ as a final answer
	(ii)		−1 0 1 2		B2	B1 for 4 correct and 1 wrong or for 3 correct and 0 wrong
						Total 4 marks
21		tan chosen		3	M1	for tan chosen
		$\frac{3.8}{5.2}$ or 0.7307…			A1	for $\frac{3.8}{5.2}$ or 0.7307… oe
			36.2		A1	for answer rounding to 36.2
						Total 3 marks

M1 for sin and $\frac{3.8}{\sqrt{"41.48"}}$ following correct Pythagoras and A1 for 0.5900…

22	$3x + 32 = 87 - 2x$		4	M1 for $3x + 32 = 87 - 2x$
	$5x = 55$ or $5x - 55 = 0$ or $5x = 87 - 32$ or $3x + 2x = 55$			M2 for correct rearrangement with *x* terms on one side and numbers on the other AND correct collection of terms on at least one side or for correct collection to 2 terms M1 for correct rearrangement with *y* terms on one side and numbers on the other e.g $3x + 2x = 87 - 32$ **or** correct collection and simplification of either numbers or *x* terms eg. $5x + 32 = 87$ or $5x = a$ or $bx = 55$
		11		A1 cao Award full marks if first method mark scored and answer is 11
				Total 4 marks

				TOTAL: 100 MARKS

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