Mark Scheme (Results)

January 2017

International GCSE Mathematics A
4MA0/2FR

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  If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

International GCSE Maths: Apart from Question 23, where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Q	Working	Answer	Mark	Notes
1 (a)		5073	1	B1
(b)		300	1	B1
(c)		1889	1	B1
				Total 3 marks

Q	Working	Answer	Mark	Notes
2 (a)		16	1	B1
(b)		12	1	B1
(c)		$2\frac{3}{4}$ blocks drawn	2	M1 $18 + 4$ or 22 A1
				Total 4 marks

Q	Working	Answer	Mark	Notes
3 (a)(i)		9		B1
(a)(ii)		20		B1
(a)(iii)		Correct line of symmetry	3	B1
(b)		Obtuse angle marked	1	B1
				Total 4 marks

4	(a)		8.65	1	B1	
	(b)		7.27	1	B1	
	(c)(i)		7.235 marked on diagram		B1	
	(c)(ii)		7	2	B1	
						Total 4 marks

5	(a)		(4, 5)	1	B1	
	(b)		(– 4, 1)	1	B1	
	(c)		Pentagon	1	B1	
	(d)		6.4	1	B1	Allow 6.3 to 6.5 inclusive
	(e)		39	1	B1	Allow 37 – 41 inclusive
						Total 5 marks

6	(a)		13	1	B1	
	(b)		Add 3	1	B1	Accept +3, 3 more, jumped forward by 3, difference = 3 oe or $3n + 1$
	(c)	$4 + 11 \times 3$ or $4 + 12 \times 3$ or $3n + 1$ Or 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37			M1	Allow $4 + 12 \times 3$ or 34 or 40 List should show a clear intention of adding 3 with at least 5 terms (including 16). Condone 1 arithmetic error.
			37	2	A1	
	(d)	$67 – 1$ or $3x + 1 = 67$			M1	
			22	2	A1	cao
						Total 6 marks

7	(a)		January	1	B1	Accept – 4
	(b)	13 – – 2	15	2	M1 A1	Accept –2 – 13 Accept –15
	(c)	–4 + 28 or 28 – 4	24	2	M1 A1	Accept 28 + –4
						Total 5 marks

8	(a)	224 – 14	210	1	B1	
	(b)	Numbers in order 14, 160, 166, 190, 192, 224	178	2	M1 A1	Ascending or descending order. Condone 1 omission.
	(c)		Correct explanation	1	B1	Eg 14 affects the mean or 14 does not affect the median.
						Total 4 marks

9	(a)		40	1	B1	
	(b)		280	1	B1	
	(c)	180 – (80 + 40)	60	2	M1 A1	For a complete method
						Total 4 marks

10		$20 - 6 \times 2.96$				M2	For a complete method
				£2.24	3		M1 for 6×2.96 or 17.76
						A1	SCM1 for 17.04
							Total 3 marks

11	(a)			$\dfrac{23}{100}$	1	B1	
	(b)	Eg 0.533(33...), 0.555(55....), 0.59, 0.6, 0.61	$\dfrac{8}{15}, \dfrac{5}{9}, 0.59, \dfrac{3}{5}, 61\%$			B3	Accept correct decimal/percentage equivalents in ascending order
							If not B3 then award B2 For 4 numbers in the correct order or For $\dfrac{8}{15}, \dfrac{5}{9},$ or $\dfrac{3}{5}$ correctly converted to decimals or %s (at least 3 SF rounded or truncated) or For all five numbers in correct descending order.
					3		If not B2 then B1 for: 2 fractions correctly converted to decimals or %s (at least 3 SF rounded or truncated)
							Total 4 marks

12	(a)		$4e + 11f$		B2	
				2		B1 for $4e$ or $11f$
	(b)	Eg $7x = 14 - 11$ or $7x = 3$			M1	For isolating $7x$ or
						for $7x - 3 = 0$ or
						for $(14 - 11) \div 7$
			$\dfrac{3}{7}$		A1	Accept 0.428(5714286....) rounded or truncated to at least 3 SF.
				2		
	(c)		$12p + 15$	1	B1	
	(d)		$2(3r + 7)$	1	B1	
						Total 6 marks

13	(a)		729	1	B1	Accept 9^3
	(b)		89	1	B1	
	(c)(i)		4.1601(0167646)		B1	
	(c)(ii)		4.2	2	B1	ft if (c)(i) > 2 significant figures
						Total 4 marks

14		$\frac{4}{2}(6 + 10)$			M1	For a complete method.
			32	2	A1	
						Total 2 marks

15	$24 \div 8$ or 3 or $35 \div 7$ or 5 or $66 \div 11$ or 6 or $8 \times 7 \times 11$ or 616 or $24 \times 35 \times 66$ or 55440			M1	For multiplier for at least one pair of edges (may be part of an expression eg $\frac{24 \times 35}{8 \times 7}$) or for volumes of at least one cuboid.
	"3" × "5" × "6" or "55440" ÷ "616"			M1	dep
		90	3	A1	NB: May see 3 or 5 or 6 indicated on diagram.
					Total 3 marks

16	(a)	e.g. $\dfrac{100}{24} \times 30$		2	M1	For $\dfrac{100}{24}$ (=4.16(66..)) or $\dfrac{30}{24}$ or 1.25 or $\dfrac{24}{100} = \dfrac{30}{x}$ oe
			125		A1	
	(b)	e.g. $\dfrac{850}{300} \times 24$ or $850 \div \dfrac{300}{24}$ oe		2	M1	Complete method to find number made
			68		A1	cao
						Total 4 marks

17	(a)	$1 - 0.15$			M1	
			0.85	2	A1	
	(b)		0.55	1	B1	
	(c)	$\dfrac{1-(0.15+0.4)}{3}$ or $\dfrac{0.45}{3}(=0.15)$			M1	
					A1	
			0.3	2		
	(d)	160×0.4			M1	
			64	2	A1	
						Total 7 marks

18	(i)		3, 5, 7	1	B1	Ignore brackets
	(ii)		1, 2, 3, 5, 7, 9	1	B1	Ignore brackets
						Total 2 marks

19	30×20 or 600		4	M1	For area of rectangle
	$\pi \times 8^2$ or 201.(0619298...) or 64π			M1	Indep for area of circle eg $\pi \times 8^2$ or 201.(0619298..) or 64π
	$30 \times 20 - \pi \times 8^2$			M1	
		399		A1	Accept 398 -399.1
					Total 4 marks

20	$\frac{35}{100} \times 1200$ oe or 420		3	M1	[Award M2 for $1200 \times (1 - 0.35)$]
	1200 – "420"			M1	dep
		780		A1	SC M1 for 1620
					Total 3 marks

21	$12.8^2 - 9.7^2$ or $163.84 - 94.09$ or 69.75		3	M1	For squaring and subtracting $[\,a = \cos^{-1}\left(\dfrac{9.7}{12.8}\right)(= 40.7...)$ **and** $\sin 40.7.. = \dfrac{x}{12.8}$ or $\tan 40.7.. = \dfrac{x}{9.7}\,]$
	$\sqrt{12.8^2 - 9.7^2}$			M1dep	For square root $[\,x = 12.8\sin 40.7..$ or $x = 9.7\tan 40.7..\,]$
		8.35		A1	Allow 8.35 - 8.352
					Total 3 marks

22	(a)		40	2	M1	For +25 or +15
					A1	
	(b)	$\dfrac{w^{13}}{w^4}$ or $w \times w^8$ or $w^5 \times w^4$	w^9	2	M1	For $\dfrac{w^{13}}{w^4}$ or $w \times w^8$ or $w^5 \times w^4$
					A1	
	(c)		$3 \leq x < 9$	2	M1	For $x \geq 3$ or $x < 9$ or $3 < x \leq 9$
					A1	Accept [3, 9) or $9 > x \geq 3$
						Total 6 marks

23	$160 - 3x + 7x - 20 = 180$ or		3	M1	For a correct equation
	$2(160 - 3x) + 2(7x - 20) = 360$ oe				
	e.g. $4x = 180 - 140$ or $-3x + 7x = 180 + 20 - 160$ or $4x = 40$ or $14x - 6x = 360 - 320 + 40$ oe			M1	For isolating the terms in x in a correct equation
		10		A1	Dep on at least M1
					Total 3 marks

24	(a)	$\cos x = \dfrac{60}{110}$ or $\cos x = 0.545(4545...)$		3	M1	
		$(x =)\ \cos^{-1}\left(\dfrac{60}{110}\right)$			M1	
			56.9		A1	$56.9 - 57$
	(b)	$90 - 56.9(4426885...)$ oe	033	2	M1ft	for complete method, ft from (a) if "(a)" < 90, $90 -$ their x
					A1ft	accept $(0)33 - (0)33.1$ or ft
	(c)(i)		105	2	B1	
	(c)(ii)		115		B1	Accept $114.\dot{9}$
						Total 7 marks