OCR
Oxford Cambridge and RSA

GCSE

Mathematics A

Unit **A503/02:** Mathematics C (Higher Tier) Paper 1

General Certificate of Secondary Education

Mark Scheme for June 2014

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

Annotation	Meaning
BP	Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
✔	Correct
✖	Incorrect
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working (after correct answer obtained), provided method has been completed
M0	Method mark awarded 0
M1	Method mark awarded 1
M2	Method mark awarded 2
A1	Accuracy mark awarded 1
B1	Independent mark awarded 1
B2	Independent mark awarded 2
MR	Misread
SC	Special case
⌃	Omission sign

The **M**, **A, B**, etc annotations must be used on your standardisation scripts for responses that are not awarded either 0 or full marks.
It is vital that you annotate these scripts to show how the marks have been awarded.
It is not mandatory to use annotations for any other marking, though you may wish to use them in some circumstances.

Subject-Specific Marking Instructions

1.   **M** marks are for <u>using a correct method</u> and are not lost for purely numerical errors.
A marks are for an <u>accurate</u> answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
B marks are <u>independent</u> of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
SC marks are for <u>special cases</u> that are worthy of some credit.

2.   Unless the answer and marks columns of the mark scheme specify **M** and **A** marks etc, or the mark scheme is 'banded', then if the correct answer is clearly given and is <u>not from wrong working</u> **full marks** should be awarded.

Do <u>not</u> award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen <u>and</u> the correct answer clearly follows from it.

3.   Where follow through (**FT**) is indicated in the mark scheme, marks can be awarded where the candidate's work follows correctly from a previous answer whether or not it was correct.

Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, eg FT 180 × (*their* '37' + 16), or FT 300 – √(*their* '5^2 + 7^2'). Answers to part questions which are being followed through are indicated by eg FT 3 × *their* (a).

For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

4.   Where dependent (**dep**) marks are indicated in the mark scheme, you must check that the candidate has met all the criteria specified for the mark to be awarded.

5.   The following abbreviations are commonly found in GCSE Mathematics mark schemes.

   -      **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point eg 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
   -      **isw** means **ignore subsequent working** after correct answer obtained and applies as a default.
   -      **nfww** means **not from wrong working**.
   -      **oe** means **or equivalent**.

- **rot** means **rounded or truncated**.
- **seen** means that you should award the mark if that number/expression is seen anywhere in the answer space, including the answer line, even if it is not in the method leading to the final answer.
- **soi** means **seen or implied**.

6.   In questions with no final answer line, make no deductions for wrong work after an acceptable answer (ie **isw**) unless the mark scheme says otherwise, indicated by the instruction 'mark final answer'.

7.   In questions with a final answer line following working space,

(i)   if the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.

(iii)   if the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.

(iii)   if the correct answer is seen in the body of working but a completely different answer is seen on the answer line, then accuracy marks for the answer are lost. Method marks could still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation ✗ next to the wrong answer.

8.   In questions with a final answer line:

(i)   If one answer is provided on the answer line, mark the method that leads to that answer.

(ii)   If more than one answer is provided on the answer line and there is a single method provided, award method marks only.

(iii)   If more than one answer is provided on the answer line and there is more than one method provided, award zero marks for the question unless the candidate has clearly indicated which method is to be marked.

9.   In questions with no final answer line:

(i)   If a single response is provided, mark as usual.

(ii)   If more than one response is provided, award zero marks for the question unless the candidate has clearly indicated which response is to be marked.

10. When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the MR annotation. **M** marks are not deducted for misreads.

11. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.

12. Ranges of answers given in the mark scheme are always inclusive.

13. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

14. Anything in the mark scheme which is in square brackets […] is not required for the mark to be earned, but if present it must be correct.

A503/02   **Mark Scheme**   **June 2014**

Question			Answer	Marks	Part Marks and Guidance	
1	(a)		26.5	3	**M2** for $\dfrac{15.9}{6} \times 10$ oe Or **M1** for $\dfrac{15.9}{6}$ soi by 2.65	
	(b)		33	3	**B2** for 33.96… to 34 seen Or **M1** for $\dfrac{90}{15.9} \times 6$ or $\dfrac{90}{their\,2.65}$	
2	(a)		4,1 3,2 2,3 1,4 oe Final answer	1	No extras.	Not just highlighted on a diagram
	(b)		$\dfrac{their\,4}{36}$ oe isw	2FT	**B1** for 36 soi or for $\dfrac{4}{n}$ seen	
3			Line from (0, 0) to (4, 80) Line from (4, 80) to (7, 125) Line from (7, 125) to (9, 125) Line from (9, 125) to (14, 0)	1 1FT 1FT 1FT	Ruled straight lines (n, m) to $(n + 3, m + 45)$ (x, y) to $(x + 2, y)$ Correct gradient down to $(p, 0)$ <u>After 0</u> **SC2** for 4 correct vertices **Or SC1** for 2 correct vertices	Condone freehand straight Points correct 'by eye' Correct gradient 'by eye'
4	(a)		Shouldn't multiply 7 by 2 oe Should be 14 + 2 oe Should be 12 ÷ 6 oe	1 1 1	Multiplied 7 by 2 (which is wrong) He did 14 − 2 (which is wrong) He did 6÷12 (which is wrong)	Any order. Any correct statement, no contradiction.
	(b)		Sub. ½ in correct LHS of equation and get 1	1		
5	(a)		$\dfrac{4}{5}$	1		

A503/02 **Mark Scheme** **June 2014**

Question			Answer	Marks	Part Marks and Guidance	
	(b)		85	1		
	(c)		English with full correct work	3	Soi by eg 85% **B2** for <u>any</u> two correct in the same form **Or B1** for Science correct as %, frac or dec. *[One value may occur in (a) or (b)]*	[Sc] 0.77[1..] or 77[.1..]% or $\frac{648}{840}$ oe [Ma] 0.8[0] or 80% or $\frac{672}{840}$ oe [En] 0.85 or 85% or $\frac{714}{840}$ oe If fractions must be same denominator
6	(a)	(i)	0.41 0.29 0.18 0.12	3	**B1** for 200 soi **And M1** for use of $\frac{\text{frequency}}{\textit{their} \text{ total}}$	At least once
		(ii)	Large sample size oe	1		
	(b)		0.3[0] oe	2	*-1 for poor notation* **M1** for *their*(0.18) + *their*(0.12) soi or for (36 + 24) ÷ (82+58+36+24) oe	Eg 0.30/1; 3 in 10 etc
	(c)		1312	2	**M1** for *their*(0.41) × 3200 soi or for 82 ÷ (82+58+36+24) × 3200 oe	Ignore rounding after correct answer
7	(a)		150 + ½ × 80 oe	1	May be in words but must mention 150 and 40 (or ½ of 80)	Nothing incorrect

Question			Answer	Mark	Answer
7	(b)*		Answer 1160 with commentary	7	eg Vertical strips – 5 × 150 = 750) Horizontal strips – 2 × 80 = 160) 1030 Radii – 3 × 40 = 120) Semi-circle – ½ × π × 80 = 125.6 to 126 Total = 1155.6 to 1156 ---
			Answer 1160 but no commentary <u>OR</u> 1155.6 to 1156 seen with commentary	6-5	1155.6 to 1156 seen but with no commentary <u>**OR**</u> Correct method soi for straight total <u>AND</u> semi-circle length with commentary
			Correct method soi for straight total <u>AND</u> semi-circle length but with no commentary	4-3	Correct method soi for semi-circle length <u>AND</u> horizontal total or vertical total or radii total <u>**OR**</u> Correct method for straight total <u>AND</u> π×80 (251 to 252) soi
			Correct method soi for straight total <u>OR</u> semi-circle length	2-1	Correct method soi for horizontal total <u>OR</u> vertical total <u>OR</u> radii total <u>OR</u> π×80 soi
			No relevant work	0	

Question			Answer	Marks	Part Marks and Guidance	
8	**(a)**		$7x$ final answer	2	**B1** for $\dfrac{7x}{1}$ or for $\dfrac{14x}{2}$ or $\dfrac{7x^2}{x}$ seen	
	(b)		$27y^2 - 18y + 20$ final answer	4	**B2** for $15y^2 - 10y$ Or **B1** for $15y^2$ or $-10y$ AND **B1** for $12y^2 - 8y + 20$	
	(c)		$5(2x - 3)$ final answer	1		Condone omission of right-hand bracket
	(d)		± 4	3	**B2** for answer $(+)4$ or answer -4 or for $(\pm)\sqrt{16}$ seen or for $(x - 4)(x + 4)$ [=0] Or **M1** for $x^2 = 16$ Or for $x^2 - 16$ [=0]	
9	**(a)**		195 to 195.5	2	**M1** for $\dfrac{4}{3} \times \pi \times 3.6^3$	
	(b)		0.8 to 0.821	2	**M1** for $\dfrac{160}{\textit{their}(a)}$	
			g/cm^3 <u>or</u> g per cm^3 <u>or</u> g per cubic cm <u>or</u> g cm^{-3}	1		

A503/02   Mark Scheme   June 2014

Question			Answer	Marks	Part Marks and Guidance	
10			12 500	3	**M2** for $\dfrac{15000}{1.2}$ oe Or **B1** for 1.2(0) or 120[%] seen	
11			2×10^5 or 2.0×10^5 or 1.96×10^5 nfww	4	**B3** for 195765 rot or 1.95765×10^5 rot seen Or **M2** for $\sqrt{[(2.1 \times 10^5)^2 - (7.6 \times 10^4)^2]}$ oe Or **M1** for $\pm(2.1 \times 10^5)^2 \pm (7.6 \times 10^4)^2$ soi	
12	(a)		0.2 placed correctly 0.3 placed correctly three times	1 1		
	(b)		0.29 oe	3	*In (a) and (b) -1 once for poor notation* **M2** for 0.5×0.4 + 0.3×0.3 oe Or **M1** for 0.5×0.4 <u>or</u> 0.3×0.3 oe	Eg 0.29/1 etc With no extra Seen separately

	(c)		0.33 oe nfww	3	**M2** for 0.5×0.3 + 0.3×0.4 +
					    *their*0.2×*their*0.3 oe
					Or **M1** for 0.5×0.3 <u>or</u> 0.3×0.4 <u>or</u>
					    *their*0.2×*their*0.3 oe
						With no extra
						
						Seen separately

13	(a)		8	3	**M2** for $6 \times \dfrac{20}{15}$ oe Or **M1** for $\dfrac{20}{15}$ or $\dfrac{15}{20}$ oe seen	Do not allow 8 after 7.9… For M2 or M1 condone 1.3[3..] for 20/15
	(b)		295 to 298	3	**M2** for $\dfrac{700}{\textit{their}(20/15)^3}$ oe Or **M1** for *their*$(20/15)^3$ or *their*$(15/20)^3$ oe	
14			-3.73 and -0.27	3	**B2** for one value correct	

9

Question			Answer	Marks	Part Marks and Guidance	
					Or **SC2** for -0.26794919 rot and -3.7320508 rot both seen Or **M1** for $\dfrac{-4\pm\sqrt{(4^2-4\times1\times1}}{2\times1}$ oe Or for $(x+2)^2-4+1$ [=0]	Both rot to at least 1 decimal place
15			50400 nfww	3	**M2** for using 406750 <u>and</u> 356350 Or **B1** for 406750 <u>or</u> 356350	For M2 or B1 condone use of 406749[.9..]
16	(a)		1, __, 0.25, 0.125, ___, ___	2	**B1** for two values correct	Accept ¼, 1/8
	(b)		5 or 6 of *their* points correctly plotted <u>Curve</u> through *their* six points	1 FT1	± ½ small square ± ½ small square. Continually decreasing curve. Not too thick or hairy.	
	(c)		1.2 to 1.4	1		

Question			Answer	Marks	Part Marks and Guidance	
17			Attempt to equate or subtract $x^2 + 4x - 12$ [= 0]	M1 A1	***Mark best attempt*** FT for *their* 3 term quadratic – **not** the original	Attempt to rearrange for *y* and sub $y^2 - 6y - 55$ [=0]

			$(x + 6)(x - 2)$	M2FT	Or for $\dfrac{-4 \pm \sqrt{(4^2 - 4 \times 1 \times -12)}}{2 \times 1}$ oe
					Or for $- 2 \pm \sqrt{16}$
					
					Or **M1FT** for $(x \pm 6)(x \pm 2)$ seen
					   or for $4^2 - 4 \times 1 \times -12$ seen
					   or for $(x + 2)^2 - 4 - 12$ [=0]
						$(y - 11)(y + 5)$

			$x = -6$ and $x = 2$ $y = -5$ and $y = 11$	B1 B1	<u>After B0</u> **SC1** for one correct x,y pair	$y = -5$ and $y = 11$ $x = -6$ and $x = 2$

A503/02   **Mark Scheme**   **June 2014**

Question			Answer	Marks	Part Marks and Guidance	
18	**(a)**		106.225…rot to at least 1dp	3	***Mark best attempt*** **M2** for $\dfrac{10^2 + 17^2 - 22^2}{2 \times 10 \times 17}$ oe Or **M1** for $22^2 = 10^2 + 17^2 - 2 \times 10 \times 17 \times \cos x$ oe	M2 soi by -0.2794117647 rot Or -95/340
	(b)		48.3 to 49	6	**M1** for ½ × 10 × 17 × sin106 oe <u>**AND**</u> **M2** for $\dfrac{106}{360} \times \pi \times 6^2$ oe Or **B1** for $\dfrac{106}{360}$ or $\dfrac{360}{106}$ oe seen <u>**AND**</u> **M1** for *their* triangle – *their* sector soi <u>**AND**</u> **A1** for 81.6 to 82 Or for 33 to 33.3	Dep. on at least 1 previous M mark scored Accept 10.6π or better

12

APPENDIX 1

Exemplar responses for question **X**

Response	Mark awarded

Exemplar responses for question **Y**

Response	Mark awarded

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