

GCSE

Mathematics A

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

General Certificate of Secondary Education

Mark Scheme for November 2015

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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.

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SUBJECT-SPECIFIC MARKING INSTRUCTIONS

1. Annotations used in the detailed Mark Scheme.

Annotation	Meaning
✓	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

These should be used whenever appropriate during your marking.

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.

M marks are for using a correct method and are not lost for purely numerical errors.

A marks are for an accurate answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.

B marks are independent of **M** (method) marks and are awarded for a correct final answer or a correct intermediate stage.

SC marks are for special cases that are worthy of some credit.

- 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 not from wrong working **full marks** should be awarded.

Do not award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen and 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 $180 \times (\textit{their} '37' + 16)$, or FT $300 - \sqrt{\textit{their} '5^2 + 7^2'}$. Answers to part questions which are being followed through are indicated by eg FT $3 \times \textit{their} (a)$. For questions with FT you must ensure that you refer back to the relevant previous answer. You may find it easier to mark follow through 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.
- cao** means **correct answer only**.
 - 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).
 - 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. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise, indicated for example by the instruction 'mark final answer'.
7. As a general principle, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered, mark the poorer (poorest).
8. 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.
9. 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.

10. If the correct answer is seen in the body and the answer given in the answer space is a clear transcription error allow full marks unless the mark scheme says 'mark final answer' or 'cao'. If the answer is missing, but the correct answer is seen in the body allow full marks. If the correct answer is seen in working but a completely different answer is seen in the answer space, then accuracy marks for the answer are lost. Method marks would still be awarded.
11. Ranges of answers given in the mark scheme are always inclusive.
12. 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.
13. 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.

MARK SCHEME

Question			Answer	Marks	Part Marks and Guidance	
1	(a)		BC – increase speed CD – stops DE – returns [home]	1	Oe ignore extras	Accept : high[er] or fast[er] oe
				1	Oe ignore extras	
				1	Oe ignore extras	
	(b)		21	2	M1 for $\frac{3}{4} \times 28$ oe	
	(c)		18.85	2	M1 for <i>(their 14.5)</i> $\times 1.30$	$14.5 \leq (\text{their } 14.5) \leq 15.5$
2			4.40	3	B2 for answer 4.4 Or M2 for $(60.76 - 4 \times 1.99) \div 3$ or 4 or 12 soi Or for $60.76 \div 4 - 1.99$ soi by 13.2[0] Or M1 for $60.76 - 4 \times 1.99$ soi by 52.8[0] Or for $60.76 \div 4$ soi by 15.19	Soi by 17.6[0], 13.2[0] or 4.4[0]
3			$9x - 22$ final answer	3	B1 for $6x - 10$ seen And B1 for $[+]3x - 12$ seen	
4			$\frac{1}{7}$	3	B2 for $\frac{3x}{21x}$ or for $\frac{3}{21}$ oe Or B1 for $21x$ seen	

Question			Answer	Marks	Part Marks and Guidance	
5	(a)		7½×2½ in correct place on grid 5×2½ in correct ft place on grid 7½×5 in correct ft place on grid	1 1 1		Condone freehand. Ignore tabs -1 for extra rectangles
	(b)		13750	3	M2 for $(50 \times 75 + 50 \times 25 + 25 \times 75) \times 2$ oe Or M1 for any two of 50×75, 50×25, 25×75 <u>After 0 scored</u> Allow SC1 for answer 137.5	Soi by 7500, 2500, 3750 Condone 1 numerical slip Soi by 3750, 1250, 1875 For M1 and M2 allow working to scale (ie using 5, 7.5, 2.5)
	(c)	(i)	125	2	M1 for 5×5×5 soi	
		(ii)	750	3	M2 for 10×15×5 Or for <u>50×75×25</u> their 125 Or M1 for dividing one length by 5 soi Or for 93750 seen	
6			72	3	M1 for $\frac{5}{6} - \frac{1}{4}$ oe soi by 7/12 oe And M1 for 42÷(a fraction) oe	eg 5/6, 1/4 or <i>their</i> 7/12 soi by 50.4, 168 or <i>their</i> 72

Question			Answer	Marks	Part Marks and Guidance	
7	(a)		16 or 17	3	B2 for $16\frac{2}{3}$ or 16.6[6...] Or M1 for $\frac{1}{6} \times 100$ oe 6	
	(b)		$\frac{3}{24}$ or $\frac{1}{8}$ or 0.125 or 12.5%	3	M2 for $(\frac{1}{4} \times \frac{1}{6}) \times 3$ oe Or for complete, correct table of values <u>or</u> list Or M1 for $\frac{1}{4} \times \frac{1}{6}$ oe Or for identifying the 3 required pairs	
8	(a)		6 [equal] sides Area of one side is $x \times x$ or x^2	1 1		
	(b)		[0] 6 24 54 96 150	2	B1 for 3 values correct	
	(c)		Their 6 points correctly plotted Curve through their 6 points	1 1	$\pm\frac{1}{2}$ small square horiz or vert Within $\frac{1}{2}$ small square horiz or vert	Not too thick or hairy
	(d)		3.2 to 3.6	1		
9	(a)		$x(x - 25)$ final answer	1		Condone $(x+0)(x-25)$
	(b)		$(x - 5)(x + 5)$ final answer	1		
	(c)		$x^2 - 15x - 250$ final answer	2	B1 for three of x^2 , $-25x$, $[+]10x$, -250	
10	(a)		36 + 14.13 to 14.14 or 50.13 to 50.14	3	M2 for $6 \times 6 + \frac{1}{2} \times \pi \times 3^2$ oe Or M1 for $[\frac{1}{2} \times] \pi \times 3^2$	Soi by 36+14.1... or better Soi by 14.1... or better
	(b)		17.98 to 18.0	3	M2 for $\sqrt{(16232.4 \div 50.1)}$ oe Or M1 for $16232.4 \div 50.1$ soi by 324	Condone use of 16200

Question			Answer	Marks	Part Marks and Guidance	
11			19.6 to 20	3	M2 for 7×1.09^{12} oe Or M1 for 7×1.09 oe soi by 7.63 Or SC1 for answer 14.56	
12	(a)		0.5 0.7 0.8	1 1 1		
	(b)		0.71 oe	3	M2 for $0.3 \times \text{their } 0.5 + \text{their } 0.7 \times \text{their } 0.8$ Or M1 for $0.3 \times \text{their } 0.5$ or $\text{their } 0.7 \times \text{their } 0.8$	Ft their tree for M2 or M1
13			$x = 3$ $y = -2$	3	B2 for one value correct Or for correct answers reversed OR M1 for equalising x or y coefficients And M1 for correctly adding or subtracting <i>their</i> equations OR M1 for correct rearrangement into $x =$ or $y =$ And M1 for correct substitution	Allow one error or omission Allow one error or omission Allow one error or omission Allow one error or omission
14	(a)		0.0069	1		
	(b)	(i)	$6.4[2] \times 10^7$	2	B1 for 64 200 000 oe	
		(ii)	Population $\div$ area E – 415.38.. S – 67.94.. W – 147.61.. NI – 128.57.. Scotland	M1 A2 A1	Seen for one country All values rot to at least 2 sf A1 for one of these values rot Dep. on 3 marks already scored	
15			2.639 to 2.64 nfww	3	M2 for figs $256 \div 0.97$ Or M1 for $0.97x = 2.56$ oe	2.64 <u>NOT</u> from 2.6368

Question			Answer	Marks	Part Marks and Guidance	
16			$(x - 5)^2 - 25 - 7 = 0$ $(x - 5)^2 = 32$ $x - 5 = \pm\sqrt{32}$ $x = 10.7$ or -0.7	1 1ft 1ft 2	B1 for each value Or for 10.6568.. <u>AND</u> -0.6568.. rot	Allow 5.65[6...] for $\sqrt{32}$
17	(a)		9 to 9.04	3	M1 for $6^2 + 8^2 - 2 \times 6 \times 8 \times \cos 79$ And A1 for 81.6823... rot	
	(b)		23.55 to 23.6	2	M1 for $\frac{1}{2} \times 6 \times 8 \times \sin 79$	Look back after answer 24. Allow 2 marks if from correct method
18			$2x^2 + 7x - 6 = 2x + 6$ $2x^2 + 5x - 12 [= 0]$ $(2x - 3)(x + 4) [= 0]$ $x = 1\frac{1}{2}$ or -4 $y = 9$ or -2	M1 A1 M2 B2 B1	Or attempt to subtract equations Or attempt to rearrange for $x = ..$ and substitute M1 for $(2x \pm a)(x \pm b)$ $a, b \neq 0$ OR M1 for $\frac{-5 \pm \sqrt{(\dots)}}{2 \times 2}$ oe And M1 for $5^2 - 4 \times 2 \times -12$ oe B1 for one value correct Correctly linked to x	M marks only for <i>their</i> $2x^2$.. quadratic
19			175.8 to 176 or 56π	3	M2 for $\pi \times 3.5 \times 12.5 + \pi \times 3.5^2$ Or M1 for $\pi \times 3.5 \times 12.5$ soi by 137.44... rot	

Question			Answer	Mark	Answer
20*			47 to 47.4° with diagram and commentary	5	EG For triangle MXN (X midpoint of BC): $MX = \sqrt{(3.5^2 + 3^2)} = 4.60977$ rot NX = 5 Angle NMX = $\tan^{-1}(5/4.60977) = 47$ to 47.4°
			47 to 47.4° with no diagram and little or no commentary	4-3	MX (4.6) <u>or</u> MN (6.8) found AND Correct trig ratio used in the correct triangle Correct triangle identified OR any correct attempt at Pythagoras
			MX (4.6) <u>or</u> MN (6.8) found OR Correct trig ratio for their values in the correct triangle	2-1	
			No worthy work	0	

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