

Mathematics A

General Certificate of Secondary Education

Unit **A503/01**: Mathematics C (Foundation Tier)

Mark Scheme for June 2012

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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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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.

Subject-Specific Marking Instructions

- 1 **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.
- 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 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 $180 \times (\text{their '37'} + 16)$, or FT $300 - \sqrt{(\text{their '5}^2 + 7^2)}$. Answers to part questions which are being followed through are indicated by eg FT $3 \times \text{their (a)}$.

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).
 - **nfw** 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 of working
 - i. and the answer given in the answer space is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.
 - ii. but the answer space is blank, allow full marks. Place the annotation ✓ next to the correct answer.
 - iii. but a completely different answer is seen in the answer space, 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.
- 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.

Question			Answer	Marks	Part Marks and Guidance	
1	(a)	(i)	44	1		
		(ii)	7	1		
		(iii)	8	1		
	(b)		2.54	2	B1 for answer figs 254 Or M1 for 5 – 0.47 – 1.99 oe	For M1 accept 500 – 47 – 199
2	(a)		Any 2 positive values that add to 12	2	M1 for attempts to add 2 pairs of equal positive values to make 24	
	(b)		16	1		
3	(a)	(i)	kilograms, kilos or kg	4	Condone spelling errors providing intention clear in parts (i) to (iv)	Accept mils
		(ii)	millilitres or ml		Accept cubic centimetres or cm ³	
		(iii)	kilometres or km			
		(iv)	metres or m		B1 for each correct answer	
	(b)	(i)	45	1		
		(ii)	4 50 oe	1	Ignore am pm, any separators Accept 16 50	oe eg ten to five
4	(a)		Moscow	1	Accept -15	Not M
	(b)		23	1	Accept -23	
	(c)		Toronto then Chicago	1	Must be that order	Accept any clear indication eg T then C
	(d)		-15	1		

Question			Answer	Marks	Part Marks and Guidance	
5	(a)	(i)	Likely	4	B1 for each correct answer	Condone spelling errors in (a) Allow any clear indication e.g. use of arrows to the correct words
		(ii)	Evens			
		(iii)	Impossible			
		(iv)	Certain			
	(b)		Both cards bigger than 7 <u>and</u> only one a multiple of 3	2	B1 if one of the criteria satisfied ie both cards bigger than 7 or only one card a multiple of 3	eg 8, 9 scores 2 marks 3, 8 scores 1 mark 9, 12 scores 1 mark 10, 11 scores 1 mark 3, 9 scores 0 marks
6	(a)		(-2 , 3)	1		
	(b)		Plots B (3, 3) and C (-3, -1)	1+1	Condone no labels but if incorrect labels and both plotted correctly allow SC1	
	(c)		(2, -1) or (-8 , -1)	1	FT (4, -3) or (-6, -3) only if C plotted at (-1, -3)	
7	(a)		1060	2	M1 for 450 + 450 + 160 oe If 0 scored then SC1 for answer 960 or 1040	SC marks cover using East stand prices, 2 adults from West and 1 child from East

Question			Answer	Marks	Part Marks and Guidance	
	(b)		612	3FT	FT 1672 – <i>their</i> (a) M2 for 19 (36 + 36 +16) – <i>their</i> 1060 oe Or M1 for 19 (36 + 36 + 16) or 1672 seen If 0 scored then SC2 for answer 512.5[0] or 584.5[0] or 378 Or SC1 for 1472.5[0] or 1624.5[0] or 988 seen	SC marks cover using East stand prices, 2 adults from West and 1 child from East, 1 adult and 1 child
8	(a)		RD RB PC PD PB SC SD SB	2	B1 for 9 correct, including the one given, with one repeat or 8 correct, including the one given, with or without one repeat	For 2 marks or 1 mark condone RC repeated
	(b)		$\frac{1}{9}$ oe dec/% only [0.11[1..]]	2FT	isw cancelling/conversion correct or FT <i>their</i> table do not accept equivalent fractions seen B1 for fraction with <i>their</i> number of combinations as denominator oe After 0 scored and table is correct, allow SC1 for $\frac{1}{8}$	Not ratio/words alone in (b) and (c) If fraction and ratio given eg 1/9 and 1 : 9 condone 1 : 9 here $\left[\frac{1}{9} + \frac{1}{9} = \right] \frac{2}{18}$ scores 0
	(c)		$\frac{3}{9}$ or $\frac{1}{3}$ oe dec/% only [0.33[3..]]	1FT	isw cancelling/conversion correct or FT <i>their</i> table do not accept equivalent fractions seen After 0 scored and table is correct, allow SC1 for $\frac{3}{8}$ only after $\frac{1}{8}$ in part (b)	If fraction and ratio given eg 1/3 and 1 : 3 here then do not condone 1 : 3
9	(a)	(i)	450	1		
		(ii)	[0].3 oe	1		

Question			Answer	Marks	Part Marks and Guidance	
	(b)	(i)	1.1[0..]	1		
		(ii)	640 and grams (g) or 0.64(0) and kilogram (kg)	1+1	First mark for 640 or 0.64 Second mark for grams with value in range 190 to 790 or kg with value in range [0].19 to [0].79	eg 640 kg scores 1+0
10	(a)		$3(a + 1)$ joins to $3a + 3$ $2a - a - 3$ joins to $a - (6 - 3)$ $a \div 3$ joins to $\frac{a}{3}$	3	B1 for each pair correctly joined	
	(b)	(i)	36	1		Condone $x = 36$
		(ii)	-6	2	M1 for $(-3)^2 = 9$ soi	Condone $x = -6$ M0 for $(9)^2$
11	(a)	(i)	74.088	1	Accept 74.1 or 74.09	Not 9261/125
		(ii)	8.1	1		Not 81/10
		(iii)	0.7125	1		Not 57/80
	(b)	(i)	3.6	1		Not 3.60
		(ii)	7000	1		Not 7000.0
12	(a)	(i)	12a final answer	1		Not $12 \times a$ etc, applies throughout question

Question			Answer	Marks	Part Marks and Guidance	
		(ii)	16a final answer	1		
		(iii)	4a final answer	1		
		(iv)	$2a + 5b$ final answer	2	B1 for either $2a \pm kb$ or $\pm ka + 5b$ in final answer or $2a + 5b$ spoiled	eg $12a + 5b$ gets B1 $2a + 5b = 7ab$ gets B1 $12a - 5b$ gets 0
	(b)		$40 + 16x$ final answer	1	Condone $40 + 16a$ or $40 + 16b$	
13			5.16	4	M3 for $6 \times [0].86$ Or B3 for figs 516 seen or answer in range 4.81 to 4.82 Or B2 for 6 cartons are needed Or M2 for $14 \times \frac{2}{5} \times [0.] 86$ oe Or M1 for $14 \times \frac{2}{5}$ oe [5.6 oe] seen After 0 scored then SC1 for rounding up <i>their</i> decimal or fraction or pictures to a whole number of cartons	Allow M2 or M1 for use of 400 [ml] instead of $\frac{2}{5}$ For M1 accept clear use of pictures approach showing $5\frac{3}{5}$ oe
14	(a)		0.6	1		
	(b)		48 and 72	3FT	FT 72 <i>their</i> 0.6×120 B2 for 48 or 72FT <i>their</i> 0.6×120 Or M1 for 0.4×120 or <i>their</i> 0.6×120	No FT if probability ≥ 1

Question		Answer	Marks	Part Marks and Guidance	
15		Fully correct solution leading to an answer of [£]314.55 showing breakdown of cost of glass as [£]42.35 and frame as [£]147.20 and adding [£]125 for the fitting	6-5	For lower mark – finds cost of window as [£]314.55 without showing full working or breakdown of costs or has errors in spelling, punctuation or grammar or good approach leading to an answer of [£]320.95 from frame cost of [£]153.6[0] (using 0.8 m)	For marking look for figures seen in the scheme first
		Cost of glass and correct figs for cost of frame Shows [£]42.35 or [£]26.18 <u>and</u> [£]16.17 and [£]147.2[0] or figs 1472 or [£]153.6[0] or figs 1536	4-3	Cost of glass or correct cost of frame For lower mark shows [£]42.35 or [£]26.18 <u>and</u> [£]16.17 or [£]147.2[0] or [£]153.6[0]	
		Area of glass or correct length of frame or perimeter of outer frame or number of 0.1 m lengths Shows 0.29[4], 0.47[6] or 0.48 or 0.77 or shows [price of glass as] figs 4235 or figs 2618 and 1617 Or shows 3.9 [m] or 39 [lengths] or shows [plastic needed in total is] 4.6 [m] or 46 [lengths] or shows [cost of frame as] figs 1472 or figs 1536	2-1	For lower mark attempts to find the area of one of the windows using a correct pair of products condoning incorrect units conversion eg 0.7×0.42 or figs 29[4] or 0.7×0.68 or figs 47[6] or figs 48 or 0.7×1.1 or figs 77 or writes a value multiplied by 3.2 or a value multiplied by 55 or a value + [£]125 clearly implied provided this is not then spoilt	
		No relevant or correct work seen	0		eg $5 + 125 = 130$ then 130×3 gets 0

Question			Answer	Marks	Part Marks and Guidance	
16			£490	5	nfw M1 for 850×1.6 A1 for 1360 M1 dep for <i>their</i> $1360 - 625 (=735)$ M1 indep for <i>their</i> $735 \div 1.5$	Dep on first M1 Accept 225 for <i>their</i> 735
17			882[.00] 216.65 6.19 222.4[0] 1334.40	1 1 1FT 1 1FT	Their $216.65 \div 35$ rot to 2dp Must be correct money notation for final mark $1112 + \text{their } 222.4[0]$	If VAT is blank but answer 1334.4[0] then VAT mark can be implied
18	(a)		Correct front elevation <u>with or without</u> join lines or other interior lines Correct plan <u>including</u> two hidden edges only	2 2	M1 for 9cm by 1cm rectangle seen or for a 3cm by 1cm rectangle seen M1 for 9cm by 3.5cm rectangle seen <i>For reversed answers, mark as scheme and then –1</i>	Condone freehand Allow 3.5 ± 0.2 cm Hidden edges dotted or solid

Question			Answer	Marks	Part Marks and Guidance		
	(b)		52 500 or 0.0525	3	isw after a correct answer if attempt to convert to other units	<i>Accept lengths in metres, consistent and correct</i>	
					M2 for complete correct method Or M1 for correct method for one relevant volume	eg M2 for $90 \times 35 \times 10 + 30 \times 35 \times 10 \times 2$ Or M1 for $90 \times 35 \times 10$ (31500) or $30 \times 35 \times 10 \times 2$ (10500, 21000)	
					Or SC2 for answer 52.5 from using measurements from part (a)	OR M2 for $90 \times 40 \times 35 - 70 \times 30 \times 35$ Or M1 for $90 \times 40 \times 35$ (126000) or $70 \times 30 \times 35$ (73500) etc	
			cm ³ or m ³ or in words or in words	1	Independent		
19			Correctly evaluates one value from 2 to 3 inclusive	1	<i>Ignore incorrect trials</i>	<i>Their values rot to at least 1dp</i>	
			Correctly evaluates one more value between 2 and 3 exclusive	1	<i>Correct trials for 2.7 and 2.8 only or 2.7 and 2.75 only or 2.7 and 2.74 only implies the first 3 marks</i>	2 -4	
			Correctly evaluates 2.7 to 2.732 and 2.7321 to 2.8	1		2.1 -3.339	
						2.2 -2.552	
			Answer 2.7 with justification	1	Final mark dependent on 3 scored. Indicating outcome for 2.7 is closer to 4 or evaluating a value between 2.71 and 2.75 inclusive	2.3 -1.633	
						2.4 -0.576	
						2.5 0.625	
						2.6 1.976	
						2.7 3.483 2.71 3.6425	
						2.8 5.152 2.72 3.8036	
						2.9 6.989 2.73 3.9664	
						3 9 2.74 4.1308	
						2.75 4.2969	
20	(a)		Large number of observations oe	1	Ignore extra statements		

Question		Answer	Marks	Part Marks and Guidance	
	(b)	$\frac{\text{Their (total of 275, 255 and 241)}}{\text{Their (total of all 6 values)}}$ $\frac{771}{1310} \text{ isw}$ <p>Or 0.58 to 0.59 or 58% to 59% Or 0.6 or 60%</p>	<p>M2</p> <p>A1</p>	<p>For M2, allow rounded or truncated values B1 for 771 <u>or</u> 1310 seen</p> <p>Dependent on M2 scored</p>	<p>Also allow</p> <p>M2 for $\frac{275}{449}$ and $\frac{255}{450}$ and $\frac{241}{411}$ [0.61..., 0.56 to 0.57, 0.58 to 0.59 oe] Or M1 for $\frac{275}{449}$ or $\frac{255}{450}$ or $\frac{241}{411}$ oe</p> <p>OR</p> <p>M2 for $\frac{257}{436 \text{ to } 437}$ oe Or M1 for $(275 + 255 + 241) \div 3$ soi by 257 or for $(449 + 450 + 411) \div 3$ soi by 436 to 437</p>

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