

GCSE

Mathematics A

Unit **A503/02**: Unit C (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 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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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.

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 for a correct final answer, a partially correct 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, i.e. 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, e.g. 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 e.g. 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 e.g. 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.
 - **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. In questions with no final answer line, make no deductions for wrong work after an acceptable answer (i.e. **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.
 - (ii) 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.

Question			Answer	Marks	Part Marks and Guidance	
1	(a)		1.40[p]	3	B1 for 7.34 seen And B1 for 4.68 or 2.66 seen	Answer 1.4 implies B1B1
	(b)		173 or 174	3	B2 for answer 173.4 to 173.5 Or M1 for 0.83×209 oe soi	Condone For M1 0.17×209 oe soi
2	(a)		e.g. - No, there could be another colour - No, he has not seen all the counters - No, he may have picked the same counter/colour multiple times	1		Condone e.g. - Yes, large number of (or 2000) trials - Yes, would have picked another colour by now - Yes, 2000 trials and only got red, blue and yellow See appendix for exemplar comments
	(b)	(i)	0.3265 0.2545 0.419 rot to at least 2dp	2	B1 for one of these values rot to 1 dp or better oe	
		(ii)	e.g. - Large number of trials oe	1		Ignore other comments Condone: - Done it enough times oe - Done it 2000 times oe
		(iii)	0.581[0] or 0.58 oe	2	M1 for <i>their</i> (0.3265 + 0.2545) or for 1 – <i>their</i> (0.419)	
		(iv)	10	2	M1 for $24 \times \text{their}(0.419)$ soi	For M1, if no working, check back – condone rounding up or down

Question			Answer	Marks	Part Marks and Guidance	
3	(a)		$7 \times 2 + 3 \times 1$ soi OR $6 \times 2 + 5 \times 1$ soi OR $7 \times 5 - 3 \times 6$ soi	2	M1 for any one of 7×2 , 3×1 , 6×2 , 5×1 , 7×5 , 3×6 soi	
	(b)		130	3	M2 for 17; 17; 4×1 ; 4×2 ; 4×3 ; 4×5 ; 4×6 ; 4×7 oe soi with at most one incorrect, one extra or one missing Or M1 for any five of these sides soi	M2 for 17×2 ; $5 \times 4 \times 2$; $7 \times 4 \times 2$ Or M1 for any two of these
4			Correctly evaluates 3.5 to 3.56 and 3.57 to 3.6 Answer 3.6 with justification	3 1 dep	Ignore incorrect trials B1 for correctly evaluating one value from 3 to 4 inclusive And B1 for correctly evaluating one more value between 3 and 4 exclusive Final mark dependent on 3 scored Calculating 3.6 gives closer to 30 than 3.5 Or evaluating a value between 3.55 and 3.59 inclusive	Their values rot to at least 1 dp 3 14 3.1 16.391 3.2 18.968 3.3 21.737 3.4 24.704 3.5 27.875 3.55 29.539 3.6 31.256 3.56 29.878 3.7 34.853 3.57 30.219 3.8 38.672 3.58 30.563 3.9 42.719 3.59 30.908 4 47
5	(a)		$3x + 4y - 5$ final answer	3	B2 for <u>two</u> of $3x$, $(+)$ $4y$, $- 5$ Or B1 for <u>one</u> of $3x$, $(+)$ $4y$, $- 5$	
	(b)		$\frac{3x}{2y}$ final answer	2	B1 for $\frac{3xy}{2y^2}$ or $\frac{15x}{10y}$ or $\frac{1.5x}{y}$ seen	
	(c)		$2x(2x + 5y)$ final answer	2	B1 for $2(2x^2 + 5xy)$ or $x(4x + 10y)$ seen Or SC1 for $4x(x + 2.5y)$ or $(2x + 0)(2x + 5y)$ seen	

Question			Answer	Marks	Part Marks and Guidance	
6	(a)		$\frac{1}{40}$	2	B1 for $\frac{25}{1000}$ or $\frac{5}{200}$ or $\frac{0.025}{1}$ or $\frac{1}{40}$ seen	
	(b)		9	4	B3 for 9.1 to 9.2 oe Or M2 for $13 \div (\frac{2}{3} + \frac{3}{4})$ soi Or M1 for $\frac{2}{3} + \frac{3}{4}$ soi	<u>OR Using daily totals</u> B3 for $1\frac{5}{12}$ $2\frac{10}{12}$ $4\frac{3}{12}$ $5\frac{8}{12}$ $7\frac{1}{12}$ $8\frac{6}{12}$ $9\frac{11}{12}$ $11\frac{4}{12}$ $12\frac{9}{12}$ oe Or B2 for $1\frac{5}{12}$ $2\frac{10}{12}$ $4\frac{3}{12}$ oe Or B1 for $1\frac{5}{12}$ oe For B1,B2,B3 rot correct to 1dp <u>OR after zero scored</u> SC2 for [Tibbs] [9 days] $6\frac{3}{4}$ tins oe And [Fluff] [9 days] 6 tins oe
7			0.05 oe	2	M1 for $1 - (0.67 + 0.28)$	
8	(a)		$7x + 26$ final answer	3	B1 for $10x + 14$ And B1 for $-3x + 12$	
	(b)		$6x^2 - 5x - 4$ final answer	3	B2 for <u>three</u> of $6x^2$, (+) $3x$, $-8x$, -4 Or B1 for <u>two</u> of $6x^2$, (+) $3x$, $-8x$, -4	$-5x$ implies (+) $3x$, $-8x$

Question			Answer	Marks	Part Marks and Guidance	
9	(a)	(i)	(3, 0, 0)	1		
		(ii)	(0, 5, 2)	1		
	(b)		6.16 or 6.2	3	M2 for $\sqrt{(3^2 + 5^2 + 2^2)}$ oe Or M1 for $3^2 + 5^2 + 2^2$ oe Or for $\sqrt{(3^2 + 5^2)}$ or $\sqrt{(3^2 + 2^2)}$ or $\sqrt{(2^2 + 5^2)}$ oe	
10	(a)		..., ..., -1, ..., ..., 8	2	B1 for one value correct	
	(b)		<i>their</i> 6 points correctly plotted <u>U shaped curve</u> through <i>their</i> six points	1 1	$\pm \frac{1}{2}$ small square Within $\frac{1}{2}$ small square of each point	
	(c)		$x = 1.55$ to 1.7 $y = -0.9$ to -0.6 $x = 4.3$ to 4.6 $y = 4.6$ to 5.2	1 1	<u>After zero</u> : SC1 for two correct x values	
11	(a)		1/5 and 4/5 oe placed correctly throughout	3	B1 for 1/5 oe placed correctly once And B1 for 4/5 oe placed correctly once	
	(b)		$\frac{8}{25}$ or 0.32 or 32%	3	M2 for $\frac{1}{5} \times \frac{4}{5} + \frac{4}{5} \times \frac{1}{5}$ oe Or M1 for $\frac{1}{5} \times \frac{4}{5}$ oe Or SC2 for answer of $\frac{9}{20}$ oe	FT M2 or M1 for <i>their</i> probabilities

Question			Answer	Mark	Answer
12*			179.8 to 180 with commentary (may be using letters)	6	e.g. : $TG = 30/\sin 28 = 63.9$ to 64 : $TM = \sqrt{(112^2 + 30^2)} = 115.9$ to 116 <u>Allow fully correct alternative methods for TG and TM</u>
			179.8 to 180 with no commentary	5-4	$30/\sin 28$ soi <u>and</u> $\sqrt{(112^2 + 30^2)}$ soi
			$30/\sin 28$ soi <u>OR</u> $\sqrt{(112^2 + 30^2)}$ soi <u>OR</u> $\sin 28 = 30/x$ <u>and</u> $112^2 + 30^2$ soi	3-2	$\sin 28 = 30/x$ <u>OR</u> $112^2 + 30^2$ soi
			$\sin$ identified as the trig ratio required for TG oe <u>OR</u> some use of Pythagoras for TM oe	1-0	No worthy work

Question			Answer	Marks	Part Marks and Guidance	
13	(a)		9	1		
	(b)		2.56 to 2.6×10^8	2	B1 for 256000000 to 260000000 oe seen	
14	(a)		$(x + 5)(x - 3)$ final answer	2	B1 for $(x \pm 5)(x \pm 3)$ seen	
	(b)		-5, (+)3	FT1	FT from <i>their</i> 2 brackets only	
	(c)		$\frac{x+5}{x+3}$ final answer	2	B1 for $(x + 3)(x - 3)$ seen	

Question			Answer	Marks	Part Marks and Guidance	
15	(a)		60	3	M2 for $1200 \div 20$ Or M1 for <i>their</i> $(1200) \div 20$ soi by answer figs 6	
	(b)	(i)	1500	3	M2 for <i>their</i> $(60) \times 5^2$ Or B1 for s.f. 5 soi	
		(ii)	150	2	M1 for 1.2×5^3 soi Or for <i>their</i> $(1500) \times 100/1000$ soi	
16	(a)		1875	1		
	(b)		13.88 to 14	2	M1 for evidence of at least 2 values of t substituted.	
17			<u>Three</u> of 3×4 ; $3 \times \sqrt{7}$; $4 \times \sqrt{7}$; $\sqrt{7} \times \sqrt{7}$ oe 19 + $7\sqrt{7}$ final answer	M1 B1		
18			15.9 to 16	3	M2 for $\frac{304}{360} \times \pi \times 6$ oe Or B1 for $\frac{304}{360}$ or $\frac{56}{360}$ soi	
19			No with correct supporting work	3	M2 for 604 compared with 595 or for 604 compared with 600 Or M1 for 8×75.5 soi by 604 <u>OR</u> M2 for 595 compared with 8×75 Or M1 for 595 used	Condone use of 75.49[9..] soi by 603.92 <u>OR</u> M2 for $\frac{595 \text{ to } 605}{74.5 \text{ to } 75.5}$ <u>AND</u> answer less than 8 Or M1 for $\frac{595 \text{ to } 605}{74.5 \text{ to } 75.5}$ For M1, NOT both 600 & 75

Question			Answer	Marks	Part Marks and Guidance	
20			$x^2 - 6x + 7 [= 0]$ or $-x^2 + 6x - 7 [= 0]$	2	M1 for eliminating y by equating or subtracting	Allow 1 error if subtracting equations
			$\frac{6 \pm \sqrt{6^2 - 4 \times 1 \times 7}}{2 \times 1}$	M1	Or fully correct 'complete the square' Condone one error , either method	<i>Their</i> quadratic, NOT the given one
			$x = 1.59$ $x = 4.41$	B1 B1	After B0B0 allow SC1 for both values of x from 1.58578...and 4.41421... rot to at least 1 dp	
			$y = -0.82$ to -0.83 and $y = 4.82$ to 4.83	B1 Dep	Dep on B1B1 or SC1 scored Correctly linked to a value of x	<u>i.e.</u> $x = 1.59$ $y = -0.83$ and $x = 4.41$ $y = 4.83$

APPENDIX 1

Exemplar responses for question 2(a)

Response	Mark awarded
No – there could be different colours at the bottom of the bag	1
No – he could have picked up the same counter multiple times	1
No – there could be a chance of other colours	1
No – there may be one or two of another colour	1
No – every time he picks a counter he puts it back in – he could be choosing the same one over and over	1
No – although he does this 2000 times, he may have picked up one more than once	1
No – he replaces each counter so he has not seen all of the counters	BOD1
No – he is picking at random	0
No – he put the counters back in the bag	0
No – because it's down to chance	0
No – you can't see in the bag	0
No – we don't know how many counters are in the bag – there could be 10000	0
Yes – he did not get any others in a test of 2000 counters	1
Yes – he would not have done it 2000 times without realising there was more than 3 colours	1
Yes – he performed the test 2000 times so the data would be correct	1
Yes – he has counted up all the colours and they add to 2000	0
Yes – the number of times he did it add up to 2000	0

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