OCR
Oxford Cambridge and RSA

GCSE

Mathematics A

Unit **A502/02:** Mathematics B (Higher Tier) Paper 4

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.

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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

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.

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.

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.

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.

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**.

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'.

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.

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.

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.

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.

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.

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

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.

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)		$\frac{3}{8}$, 40%, $\frac{5}{12}$ oe with correct method	4	**M1** for attempt at using correct method for changing a value to a different denominator, a decimal or % oe **A1** if correct $\frac{3}{8} = \frac{27}{72} = \frac{45}{120}$ =0.3[7…] or 0.38 $\frac{5}{12} = \frac{30}{72} = \frac{50}{120}$ =0.41[…] or 0.42 Or if converting to unit fractions **M1A1** for any 1 of $\frac{3}{8} = \frac{1}{2.6(..)}$, $40\% = \frac{1}{2.5}$, $\frac{5}{12} = \frac{1}{2.4}$ And **A1** for second correct conversion to same form OR If 0 scored **SC2** for reasonable attempt at drawing equivalent bars (or other diagrams) followed by correct answer Or **SC1** for correct answer with no working	soi by $\frac{48}{120}, \frac{40}{100}, \frac{2}{5}$ etc 0.38 does not alone imply correct method Condone 2.6[…], 2.5 or 2.4 for **M1** only Fourth mark dependent on **M1A2**
2	(a)		C	1		
	(b)		A	1		
	(c)		D	1		

Question			Answer	Marks	Part Marks and Guidance	
3	(a)		Trapezium	1		
	(b)		126 Alternate angles	B1 B1	Condone 'Z' but not 'alternating'	Not with contradictory comments
	(c)		144	3	**B1** for $g + h = 180$ soi **M1** for $180 \div 5$ or 36 seen	eg by ADC = 54°
4	(a)		1 315 200	1		
	(b)		1315.2	1FT	FT *their (a)* ÷ 1000	
	(c)		0.411	2	**M1** for digits 411 seen	

Question			Answer	Marks	Part Marks and Guidance	
5	(a)		Negative Weak	B1 B1	'Strong', does not score (Indep)	Allow 'moderate', 'medium' 'quite/fairly strong' 'low', 'poor' etc
			No oe	1	'Scattered' or 'random' without 'no' does not score	Strong / weak implies a correlation so does not score
	(b)	(i)	4 points correct	2	**B1** for 2 points correct Or **B1** for 2 or more columns correct height	$\pm$ half a small square. Use overlay as a guide. If columns then mark consistently left, middle or right of top
		(ii)	The points are nowhere near a straight line oe	1	Accept 'No correlation', 'points form a curve', there is no linear correlation, the plotted points do not form a line	Random', 'scattered' does not imply no correlation
		(iii)	[Getting older means] reaction time decreases [remains stable] then starts to increase.	1	Condone 'slow' then 'fast' then 'slow' soi If describing just the ends or just the middle, need to see comparatives such as slower or fastest etc.	Do not accept a list of ages and reaction times alone. Do not accept "It starts high then falls and rises again" or converse (as, in either case, "it" is undefined)
6	(a)		$y > 12$ final answer	2	**M1** for $3y > 25 + 11$ or $y > \frac{their\,(25 \pm 11)}{3}$ or better Or **SC1** for $y = 12$, $y < 12$, $y \leq 12$, $y \geq 12$ or 12	
	(b)		4, 5, 6	2	**M1** for (3 to 4) $< w <$ (6 to 7) or for [$3w =$] 12, 15, 18 or for two of the three given (and no incorrect values) or for 4, 5, 6 and one incorrect value	

Question			Answer	Marks	Part Marks and Guidance	
7	(a)		Correct rotation	3	**B2** for correct orientation, wrong position or for correct 90° anti-clockwise rotation about (2, 0) Or **B1** for two correct vertices on correct rotation attempt or correct 180° rotation about (2, 0)	In both (a) and (b) Ignore label. Clear intention to plot these points, condone freehand. [Overlays available]
	(b)		Correct enlargement	2	**B1** for SF -2 wrong centre, or SF = 2 centre (0, 0) or other negative SF centre (0, 0) or two correct vertices on correct enlargement attempt	Orientation must be different and all in third quadrant

Question			Answer	Marks	Answer

8*			Two correct answers with units and correct working, clearly laid out	5	SF = 10/4 oe or with 'internal' ratio eg 6/4
					$x = 6 \times$ SF
					   = 15cm
					$y = 22.5/$SF
					   = 9cm

			As 5 marks but missing some working or units or with SF incorrectly evaluated and remainder of solution correct FT	4 – 3	For the lower mark two correct answers but missing working and units or one answer will be correct with working (with or without units) or SF incorrectly evaluated and remainder of solution correct FT for one answer or both with no units
			SF correct 10/4 or 4/10 or 2 : 5 oe and attempt to use in an evaluated calculation or one correct answer with no working	2 – 1	For the lower mark there will be an attempt to find a SF
			No correct work seen	0	

Question			Answer	Marks	Part Marks and Guidance	
9	**(a)**		4	1	Not 4x	Allow 4/1
	(b)		(0, ⁻5) cao	1		
	(c)		$y = 4x$	2	**B1** for 4x, $y = mx$ (any $m \neq 0$), $y = 4x + c$ (any $c \neq 0$)	Condone $y = 4x + 0$ for **2** marks And $y = mx + 0$ for **1** mark
	(d)		$-\dfrac{1}{5} \times 4 \neq {}^{-}1$	1	Or gradient should be $-\dfrac{1}{4}$ Not –ve reciprocal etc	Soi 'Inverse' does not mean 'reciprocal'

Question			Answer	Marks	Part Marks and Guidance	
10			$x = {}^-1$ oe $y = 5$ nfww	3	**M1** for multiplying one (or both) equation(s) to get either coefficient equal (allow 1 error) eg $x + 3y = 14$ $6x + 3y = 9$ or $2x + 6y = 28$ $2x + y = 3$ **A1FT** for either x or y correct oe isw $y = 5$ or $x = {}^-1$ Or if substitution used **M1** for rearranging and attempt at substituting eg $x + 3(3 - 2x) = 14$ or $2(14 - 3y) + y = 3$ or better (allow 1 error) then **A** mark as above	If no more than 1 error in multiplication (and no errors in addition/subtraction) follow through for a maximum of **2** marks If separate attempts made to eliminate x and y mark to the candidate's benefit Allow FT if exact or correct to at least 2sf Correct x or y with no working implies **M1A1** Correct answer with no working scores **3**
11	(a)		$0.\dot{5}$ final answer	1		Condone $0.5\dot{5}$, 0.5r, 0.555 …
	(b)		$67 \div 33$	4	**B3** for $x = \dfrac{201}{99}$ Or **B2** for $99x = 201$ or figures 33 & 67 Or **M1** for 203.03[03…] or figures 201 & 99	Condone $\dfrac{67}{33}$ Condone 3.03[03…]

Question			Answer	Marks	Part Marks and Guidance	
12	(a)		$x = 0.5 \to 0.7$ $y = 2.6 \to 2.8$	1		Accept fractions within given range
	(b)		$x = 1.1 \to 1.4$ $y = 4.6 \to 4.9$	2	**M1** for $2x + 2y = 12 \Rightarrow x + y = 6$ or indication they are using $y = 3x + 1$ and $x + y = 6$ or for one correct value	Accept fractions within given range
13	(a)	(i)	$125\sqrt{2}$ final answer	1		
		(ii)	250	2	**M1** for *their* **(a)(i)** $\times \sqrt{2}$	
	(b)		$500\sqrt{2}$	3	**M2** for $\dfrac{1000}{\sqrt{2}} \times \dfrac{\sqrt{2}}{\sqrt{2}}$ or better Or **M1** for $\dfrac{1000}{\sqrt{2}}$ oe	