OCR
Oxford Cambridge and RSA

GCSE

Mathematics A

Unit **A501/02:** Mathematics A (Higher Tier)

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.

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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

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, 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 × (*their* '37' + 16), or FT 300 – $\sqrt{}$(*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.

   (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)		16	2	**M1** for 24/3 or for 8 or for 8 × 3 = 24	Common with Foundation
	(b)		C 15 600 H 10 400	3	**B2** for one correct on answer line or for 15 600 and 10 400 seen Or **B1** for 15 600 or 10 400 seen Or **M1** for 26 000/ *their*(3 + 2) or for 5200 Condone answers reversed on answer line if clearly correct in body of script with correct person (treat as transfer error)	Common with Foundation
2	(a)	(i)	148.877	1	Condone rot to at least 4 sf	
		(ii)	5.4 as final answer	2	**B1** for 5.425 or 5.42 or 5.43 Or **SC1** for 7.5	
	(b)		0.4 or $\frac{2}{5}$ as final answer	1		
	(c)		$(7 \times 2 + 6)^2 = 400$ $(6 + 4) \times 2 - 5 = 15$	1 1	For each answer, ignore superfluous extra pairs of brackets	
3	(a)		30 to 32	2	**M1** for 6.1 to 6.3 or 61 to 63	Common with Foundation
	(b)		312 to 314	1		Common with Foundation

Question			Answer	Marks	Part marks and guidance	
	(c)		Correct angle for bearing used, tolerance 2° Mark for C 3.2 cm from A, tolerance 2 mm	1 1	Accept line or evidence such as dot in correct direction from A; Or other evidence eg line from A 3.2 cm long If C not marked, allow 2nd mark for an arc centre A radius 3.2 cm drawn, tol 2mm; allow 2 marks for line in correct direction and correct arc centre A	Use overlay; if in doubt, use protractor or ruler (accept obtuse angle NAC from 145-149 inclusive) If just a dot, need to be convinced it is not just a fleck from scanning – may be implied by use in (b) Allow **MR** for B used instead of A – move overlay as required to check accuracy, using protractor or ruler if in doubt ie they can gain 1 mark if C is ft correct Common with Foundation
4	**(a)**		$5a + 14$ as final answer	3	nfww **B2** for $5a \pm$ other number or for other a term + 14 Or **B1** for other answer involving $5a$ and/or 14 Or **M1** for $8a + 20$ or for $\pm 3a \pm 6$	eg **B1** for $5a = 14$
	(b)		$4y(3 + y)$ as final answer	2	**B1** for $4y(...)$ or $...(3 + y)$ or $4(3y + y^2)$ or $y(12 + 4y)$ or $2y(6 + 2y)$ Or **B1** for $4y(3 + y)$ seen then spoilt	
5	**(a)**		6, 9, 14	2	**B1** for two terms correct in the correct position Or **SC1** for 5, 6, 9	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Part marks and guidance</th><th></th></tr>
<tr><td></td><td>(b)</td><td></td><td>6n – 1 as final answer</td><td>2</td><td>Accept unsimplified

M1 for 6n oe soi
Or SC1 for 6x – 1, 6nth – 1 etc</td><td>Condone poor notation such as n6 etc or n = 6n – 1</td></tr>
<tr><td>6</td><td></td><td></td><td>36</td><td>2</td><td>B1 for 12 or 9 or 18 as answer

Or B1 for prime factorisation of 108 and 72 (may be in tree or division or Venn diagram) condoning one error

Or B1 for
<table><tr><td></td><td>108</td><td>72</td></tr><tr><td>4</td><td>27</td><td>18</td></tr><tr><td>3</td><td>9</td><td>6</td></tr><tr><td>3</td><td>3</td><td>2</td></tr></table>
Or B1 for 2 × 2 × 3 × 3 oe

Or B1 for 72 = 2 × 36 and 108 = 3 × 36</td><td>B0 for just 3^2</td></tr>
</table>

Question			Answer	Marks	Part marks and guidance	
7	(a)		Midpts 25, 35, 45... seen or implied	M1	For 3 or more correct; need not be used	eg may be seen by table
			$f \times x$ attempted	M1	Sum seen or at least 3 products seen FT *their* 'midpoints'; *their* 'midpoints' need to be in the correct class eg correct products are 75, 245, 585, 330, 65	eg allow 2nd **M1** for use of endpoints not midpoints; 1300 implies first two Ms; 1450 and 1150 imply **M0M1**; working for 2nd **M1** may be by table First two **M1**s may be earned for correct work seen even if not then used in the final answer
			(*Their* sum of $f \times x$) ÷ 30 soi	M1	If correct: 1300 ÷ 30	May be earned even if their 'midpoints' are not in the correct class eg Midpoint used as 25 throughout earns **M0M0M1** (*their fx* = 75, 175, 325 etc then 750 ÷ 30)
			43.3(3...)	A1	Allow **A1** for 43 if correct method seen Allow **B4** for 43.3(3...) **SC2** for 38.3(3...) or for 48.3(3...)	Common with Foundation
	(b)	(i)	48	1		
		(ii)	27	2	**M1** for 36 or 63 or both; may be on diagram	
8	(a)		5 and $^{-}5$	3	**B2** for one of these Or **M1** for $x^2 = 25$ Or **B1** each for embedded answers	

Question			Answer	Marks	Part marks and guidance	
	(b)		$[a =][\pm]\sqrt{\frac{S}{2} - 2bc}$ or $\sqrt{\frac{S-4bc}{2}}$ oe as final answer	3	nfww **M1** for $2a^2 = S - 4bc$ or for $\frac{S}{2} = 2bc + a^2$ **M1** for $\frac{S}{2} - 2bc = a^2$ or $\frac{S-4bc}{2} = a^2$ or FT **M1** for $[a =][\pm]\sqrt{\frac{S}{2} - 2bc}$ oe or FT ; award last **M1** at stage of final answer Or **M2** for complete correct inverse flow diagram and **M1** for final answer **SC1** if no working, and final answer appears with just one error	**M1** for each of FT correct, constructive steps leading to answer, eg last **M1** FT *their* a^2 = ... The square root symbol must extend to include at least the start of the second term, if there is one, and below the fraction line For mixture of fractions and decimals or triple decker fractions etc, award **M0** where they first occur (unless they sort them later) then ft
9			$\sqrt{15^2 + 35^2 + 10^2}$ 39.3 to 39.4 and no	M2 A1	**M1** for $15^2 + 35^2 + 10^2$ or 1550 (may be in two steps of 2D Pythagoras) Ignore additional comments Allow 39 only after $\sqrt{15^2 + 35^2 + 10^2}$ or $\sqrt{1550}$ is shown with no premature approximation Allow **B3** for 39.3 to 39.4 nfww and no	If in two steps then figures are: 15, 35 pair = 1450 sq rt = 38.0788.. 15, 10 pair = 325 sq rt = 18.0277... 35, 10 pair = 1325 sq rt = 36.4005.. (roots may be rot to 3sf or more) + must combine to earn **M2** or **M1** ie **M0** for just 2D Pythagoras

Question			Answer	Marks	Part marks and guidance	
10	(a)		$T + 2R = 658$ [so OK]	B1	Or may use one of given values to find limits for the other	Using $T = 222$, $164 \leq R \leq 239$ Using $R = 218$, $114 \leq T \leq 264$
			$\tan g = \frac{R}{T}$ or $\frac{218}{222}$	M1	Condone poor notation	May find hypotenuse =311.(1...) and then use sin or cos
			Inverse trig fn seen or used	M1	FT *their* trig statement even if sin or cos used; may be implied by answer	If using sine rule, need to get to $\sin g = \frac{218 \times \sin 90}{311(.1...)}$ for **M1**, and a similar stage for use of cos rule
			44 or 44.4 to 44.5 [so doesn't satisfy]	A1	**A0** if say 'does satisfy' oe or: **M2** for $R = 222 \times \tan 42$ or $T = \frac{218}{\tan 42}$ Or **M1** for $\tan 42 = \frac{R}{222}$ or $\tan 42 = \frac{218}{T}$ **A1** for $R = 199.8$-200 so no or for $T = 242(.1...)$ so no (may be as inequalities but not required) If M0, allow **SC1** for scale drawing finding angle as 44 to 45·[and 'so No']	

Question			Answer	Marks	Part marks and guidance	
	(b)		Valid checking of all conditions and final conclusion max $R = 215$	4	Condone omission of explicitly checking conditions 'T must be at least 220 mm' and 'R must be at most 220 mm' **M1** for $[R =]270\tan 42$ or $\tan 42 = \frac{R}{270}$ or correct trig statement using $T = 270$ and R = 215 or 220 **M1** for $2R + 270 = 700$ seen or used Allow **A1** for one of [R =] 243(.1...) or R = 215 or g = 38.5... Or allow **M1A1** for $2R + T$ oe = 710 from using R = 220 and T = 270	May find hyp and use sin or cos but need to go on to have used T and R eg **M1** for $2R$ = [280 to] 430 accept inequalities These values will imply the relevant **M1** if not already earned; allow **M1A1** for 2 × 215 + 270 = 700, allow amongst other trials if identified as correct **M0** for just trials with other values of R; **M0** for scale drawing instead of trig (but may earn other M1)
11	**(a)**		Fds 0.4, 0.7, 1.25, 0.8, 0.36	1	At least 3 correct; may be implied by heights of bars	
			Bars of correct height	1	Tolerance 1 mm unless on gridlines	FT their scale;
			Bars of correct width	1	Must have no bar 0-10	Ignore additional polygons
			Vertical axis with consistent linear scale and labelled 'Frequency density' oe	1	**B0** for scale of 0-40 etc for frequency graph even if labelled frequency density	Accept abbreviations;

Question			Answer	Marks	Part marks and guidance	
	(b)	(i)	3	1		
		(ii)	It was between 0 and 2 hours	1	Accept 'it was less than 2 hours' or 'it was 2 hours or less' or 'from 0 to 1.99 h' or better	0 for comment only about number of people cycling shortest time; must refer to the time See appendix for more exemplars
12			$c = 8$ dep on d correct $d = -6$	2 1	**M1** for $2c + d = 10$ or $2c - 6 = 10$ or FT *their d* Condone answers reversed on answer line if clearly correct in body of script **SC2** for answers reversed on answer line with no working	

APPENDIX

Exemplar responses for Q11(b)(ii)

Response	Mark
only a few people cycled between 0 and 2 hours	**1**
Relatively very few did short distance, so less arrived between 0-2 hours	**1**
The shortest distance was up to 2 hours	**1**
2.5 people did up to 2 hrs [ignore number of people]]	**1**
Five people did 2 hours	**0**
only 5 people cycled the shortest time	**0**

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