OCR
RECOGNISING ACHIEVEMENT

GCSE

Mathematics A

General Certificate of Secondary Education

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

Mark Scheme for November 2013

Oxford Cambridge and RSA Examinations

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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 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)		24 : 55 or 1 : $\frac{55}{24}$ or 1 : 2 $\frac{7}{24}$ or $\frac{24}{55}$: 1 or exact decimal equivalents	3	**M1** for 1100 [g] or 0.48 [kg] seen **M1** for correct interim step in simplification of 480 : 1100 oe If **M0**, allow **SC2** for 55 : 24 or for 24 g : 55 g Or **SC1** for 55 g : 24 g	Need not be formal notation MR total ingredients = 1.1 kg: allow first **M1** also for 620 [g] or 0.62 [kg] seen and allow second **M1** for correct interim step in simplification of 480 : 620 oe, eg 24 : 31 or for rounded forms such as 1 : 2.292 or 0.436 : 1
	(b)		1375 or 1.375 or $1\frac{3}{8}$ g or kg as appropriate	2 1	**M1** for 1100 × 1.25 oe in kg or for figs 1375 or for 2.29(...) × 600 oe Accept kg with answer < 100 Accept g with answer ≥ 100 Ignore wrong conversion after a correct answer **0** in question for just 1100 g or 1.1 kg as answer or 600 g or 0.6 kg as answer Allow **3** for 1 kg 375 g	MR total ingredients = 1.1 kg: allow **M1** also for 620 × 1.25 oe in kg or for figs 775 Give one fewer marks than otherwise earned for answer left in ratio form eg give **1** for 1375 : 600
2	(a)		8	2	**M1** for 12 or for evidence of ÷ 6 then − 4	

Question			Answer	Marks	Part Marks and Guidance	
	(b)	**(i)**	$6n + 4$	1	Need not be simplified	eg **1** for $n6 + 4$ or $6 \times n + 4$ **0** for other letters used but condone N used
		(ii)	7	3	nfww **SC2** for embedded answer $6 \times 7 + 4 = 7 + 39$ OR **M1** for collecting n's **M1** for collecting numbers FT *their* $an + b = n + 39$, $a \neq 1$ or 0 and $b \neq 39$ or 0	Allow 7 from trials if correct answer found; otherwise **M0** eg **M2** for $5n = 35$ after correct equation
3			Pie chart with all sectors correct: J 60°, A 120°, V 96°, S 84°, tolerance 2° and correct labels	3	**M2** for a 4-sector chart with 2 sectors within tolerance Or **M1** for 60, 120, 96 and 84 seen or for a pie chart with 1 correct angle (even if not 4 sectors) Accept abbreviations for labels	Use the scoris protractor to check the angles: for unruled lines, check the angle where a line crosses/ would cross the circumference Condone 5, 10, 8, 7 for labels
4	**(a)**		567.5 to 567.6 or 568 or 570	3	nfww **M2** for $\sqrt{466^2 + 324^2}$ oe or equivalent complete method using trig (condone poor notation) Or **M1** for $466^2 \pm 324^2$ or for 322 132 or any attempt at Pythagoras (eg 217 156 + 104 976)	570 from scale drawing scores **0**
	(b)		More than 90 since diagonal should be less than 572 oe	1FT	FT only if at least **M1** gained in (a)	

Question			Answer	Marks	Part Marks and Guidance	
5	(a)		D in correct position and sides AD and CD drawn using arcs	2	**M1** for one of AD and CD correct or for D in correct position with no arcs or for CD = 5 cm and AD = 7.5 cm seen tolerance 1 mm	Use overlay/ruler
	(b)	(i)	Angle bisector of B drawn with correct arcs	2	Tolerance 2°; **B1** if no arcs	Condone E not marked Use protractor eg with angle BCE set at 40° and accept tolerance of 2°
		(ii)	405 to 435 from acceptable angle bisector or FT	2	FT (5 × *their* BE in mm) calculated, tolerance 15 **B1** for answer up to and including 5 below or above acceptable range FT Or **M1** for 8.4 [cm] or 84 [mm] or FT *their* BE, tolerance 3 mm	Use ruler with one end set on B No FT for a line BE not drawn eg for E correctly 8.4 cm from B, allow **B1** for 400 to 440 if **B2** not earned eg allow **M1** for answer of 81 on answer line from acceptable angle bisector
6	(a)		2, 6, 12	2	**M1** for two correct in the correct positions or for 6, 12, 20 or 0, 2, 6	
	(b)		$10 - 3n$ oe	2	Accept unsimplified **M1** for $3n$ or $-3n$ oe soi Or **SC1** for $3 - 10x$ oe	Condone poor notation such as $n3$ etc or $n = 10 - 3n$
7	(a)		288	1		
	(b)		$(9 + 3) \times (7 - 5) = 24$	1	Ignore superfluous pairs of brackets	

Question			Answer	Marks	Part Marks and Guidance	
	(c)		72	3	nfww **M2** for 360 = 72 × 5 and 216 = 72 × 3 OR **M1** for an attempt at a factor tree or for division for 360 or 216, with at least three successive divisions by primes **M1** for correct factor tree or division for 360 (= $2^3 \times 3^2 \times 5$) or 216 (= $2^3 \times 3^3$)	May be from trials, trees or multiples
8	**(a)**		57 to 57.5	2	**M1** for an attempt to use 26 or 26.5	Allow **M1** for 26 or 26.5 seen with no other attempts
	(b)		Cumulative frequencies [1, 5,] 16, 29, 37 soi Points plotted at correct heights and correct endpoints 74.5 to 75, 79.5 to 80 etc, FT one error in cumulative frequencies Points joined with smooth curve or straight line segments	1 1 1	May be implied by plots at correct heights FT for ascending graph only; ignore curve to left of (65, 1)	
	(c)		6 to 8.5 True	2 1Dep	nfww eg not from reading off at 10 and 30 **M1** for UQ 78.5 to 80 or LQ 71.5 to 72.5 or for reading off lines at both 9 to 10 and 27 to 29 on their increasing graph but **M0** if both 10 **and** 30 used Dependent on IQR of 6 to 8.5, however obtained	**0** in this part if their graph is not increasing The marks in this part are all obtainable from an increasing graph in part (b) plotted at midpoints If an error in *their* 37 in part (b), allow FT for this part, unless *their* 37 is 40

Question			Answer	Marks	Part Marks and Guidance	
9	(a)		$a = 11$ $b = -21$	1 1	**0** for 11 if it comes from eg $11x^2$ Allow **1** for -21 independent of errors in coping with the x's If **0** for question, allow **SC1** for LHS = $11x - 21$ soi	
	(b)		Any integer pair of values satisfying the relationship $4c + d = 23$, except $c = 11$, $d = -21$	2	nfww **M1** for $4c + d = 23$ soi or LHS = 23 or for non-integer pair satisfying $4c + d = 23$ eg $c = 5.5$, $d = 1$	eg **2** for c | 1 | 5 | 7 | d | 19 | 3 | -5 | eg **M1** for $cx + d = 23$
10	(a)		0.6 or $\frac{3}{5}$	2	**M1** for $5x - 2 = 1$	
	(b)		$10x + 3$	2	**M1** for $5(1 + 2x) - 2$	
11	(a)		Height of triangle = $h - e$ oe Tan $a = \frac{h-e}{d}$ or $h - e = d \times \tan a$	1 1	May be on diagram If **0** in question, allow **SC1** for clear attempt to use tan a = opp/adj with adj = d even if opp = h	eg y shown on diagram and $h = y + e$ used
	(b)		17.3(...) or 17	2	**M1** for $1.7 + 25 \times \tan 32$	

Question			Answer	Marks	Part Marks and Guidance	
	(c)		$[a =]\tan^{-1}\left(\frac{h-e}{d}\right)$ oe	3	Accept invtan, arctan, condone lack of brackets **M1** for $h - e = d \times \tan a$ **M1** for $\tan a = \frac{h-e}{d}$ If **0**, allow **SC1** for $[a =]$ $\tan^{-1}$(*their* expression for tan *a*)	eg after first step of $\tan a = \frac{h}{e+d}$ allow **SC1** for $a = \tan^{-1}\left(\frac{h}{e+d}\right)$
12	**(a)**		7	1		
	(b)		17.5 with correct working	2	**B1** for correct answer with no working Or **M1** for 3, 6, 2, [3], or [3], 7, 4 found, condoning one error or for attempt to locate 13^{th} value or for eg attempt to 'cancel' equal areas from each end	For **2** marks, must show at least the working which would gain an **M1**

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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Head office
Telephone: 01223 552552
Facsimile: 01223 552553

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