GCSE

Mathematics A (Two Tier)

General Certificate of Secondary

Component **J512/03:** Paper 3

Mark Scheme for June 2011

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

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.

© OCR 2011

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

Subject-Specific Marking Instructions

1　**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 awarded for a correct final answer or a correct intermediate stage.
　SC marks are for <u>special cases</u> 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 <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.

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 – √(*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.

- 　**cao** means **correct answer only**.
- 　**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).
- 　**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   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 and the answer given in the answer space is a clear transcription error allow full marks unless the mark scheme says 'mark final answer' or 'cao'. Place the annotation ✓ next to the correct answer.

     If the answer space is blank but the correct answer is seen in the body allow full marks. Place the annotation ✓ next to the correct answer.

     If the correct answer is seen in the working but a completely different answer is seen in the answer space, then accuracy marks for the answer are lost. Method marks would 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.

MARK SCHEME

Question			Answer	Marks	Part marks and guidance	
1	**(a)**		0.35, 35%, $\frac{35}{100}$ oe isw	**2**	**M1** for 1 – (0.3 + 0.25 + 0.1) soi by answer 0.71	0.35, 0.35:1 etc scores M1 only
	(b)		60	**2**	**M1** for 200 × 0.3 soi	$\frac{60}{200}$ scores M1 only
	(c)		0.35, 35%, $\frac{35}{100}$ or $\frac{7}{20}$	**2**	Allow 2 marks for $\frac{70}{200}$ **M1** for 0.25 + 0.1 soi by answer 0.26	0.35, 0.35:1 etc scores M1 only 1
2			20	**2**	**M1** for 2 ÷ 0.1 or 2÷6 (×60) or 1÷3 (×60) or 0.33 or better (× 60) seen	This method mark may be gained in the last part for 4 ÷ 0.1 or 4÷6 (×60) or 2÷3 (×60) or 0.66 or better (×60) seen.
			Stopped oe 2 Constant oe	**1** **1** **1**	 Accept steady, fixed oe or average, faster, higher, increased oe	 NOT 'fast', 'high', 'increasing' etc
			40 or 2 × *their*(20)	**FT1**		If M0 scored for first speed, 40 will score 2 (from M1, 1)

3	(a)		Rotation, rotate, rotated cao	1	NOT 'turn' etc	Loses first mark if mention of other/extra transformations. Other 2 marks still available.
			90° anticlockwise or 270° clockwise	1	Accept ¼ anticlockwise or ¾ clockwise	Condone +90° alone or -270° alone Or 90 +360n anticlockwise n=1, 2, … Or 270 +360n clockwise n=1, 2, …
			About (0,0) or origin	1	Accept O	Condone 0 (zero) but NOT $\begin{pmatrix}0\\0\end{pmatrix}$
	(b)		Shape at (4, 4) (1, 4) (1, 3) within 2mm of correct points	2	**B1** for either horizontal or vertical move correct Allow freehand	
	(c)		Shape at (4, −3) (5, −3) (5, 0) within 2mm of correct points	2	**B1** for any correct reflection of B in a vertical line **Or SC1** for correct reflection of B in y=1 Or for correct reflection of A or *their* P in x=1 Allow freehand	
4	(a)		16	1		In both parts, allow marks for embedded answers if not contradicted
	(b)		7½, 7.5, 7$\frac{3}{6}$, $\frac{15}{2}$, $\frac{45}{6}$ isw nfww	3	**M1** for 6x −15 seen or 2x − 5 = 10 **And M1** for 6x = 30 + *their*15 oe or 2x = *their*10 + 5 oe	

5	(a)		92	2	**M1** for 46 ÷ 50 (× 100) soi **Or SC1** for answer 8	
	(b)		963.5	3	**B1** for 10% = 82, 5% = 41, 2½% = 20.5 or 10% = 82, 1% = 8.2, ½% = 4.1 etc seen **And M1** for 820 + *their*(10% + 5% + 2½% values) oe **Or M2** for 1.175 × 820 oe **Or M1** for 0.175 × 820 oe	B mark may be implied by 143.5 seen At least 3 relevant correct percentages seen or implied With attempt at long multiplication With attempt at long multiplication
6	(a)	(i)	54	2	**M1** for 9 × 12 ÷ 2 soi	
		(ii)	540 000	FT1	Follow through *their* (i) × 10 000	
	(b)		15	3	**M2** for $\sqrt{(12^2 + 9^2)}$ oe soi or $\sqrt{225}$ **Or M1** for $12^2 \pm 9^2$ soi	**Or M2** for 5 × 3 (from 3,4,5 triangle ×3) if clear
7			Line parallel to one side of house 4cm from house Arc of circle, centre at tree 6cm from tree Indicates 2 correct regions only	M1 A1 M1 A1 A2	Ruled ±2mm Compass drawn, any length of arc ±2mm **A1** for 1 correct region indicated Or for 2 'correct' (FT) regions after 3 marks scored **Or SC1** for at least one point or some shading within each of the correct regions and no points or shading outside the correct regions.	More than half length or width of house If both lines drawn, mark best For SC mark, points/shading must be within the overlay boundaries ± 2mm

8	(a)		E.g. '27 in 3 times table' Or '27 is divisible by 3' Or '9×3=27' Or '27÷3=9' Or '27÷9=3'	1	oe	
	(b)	(i)	$3(n + 1)$ or $3n + 3$	1		
		(ii)	E.g. '3 is a common factor' Or 'Each term has a 3 in it' Or '$(3n + 3) \div 3 = n+1$'	1	oe Dependent on $3(n + 1)$ or $3n + 3$ seen in (b)(i) or (b)(ii)	
	(c)		$3n + 3 = 78$ oe (n=)25 25, 26, 27	**M1** **A1** **B1**		$n = 75 \div 3$ as minimum for M mark
	(d)	(i)	E.g. $2 \times 3 \times 4 = 24$ <u>and</u> $6 \times 4 = 24$ or $24 \div 6 = 4$ oe	1	Answer to product must be correct	NOT just $2 \times 3 \times 4 = 24$ or $1 \times 2 \times 3 = 6$
		(ii)	One number will be a multiple of 2 oe and one number will be a multiple of 3 oe	1	cao	
9	(a)		20 cao nfww	2	**B1** for $40\,000 \div 10^2$ or $40\,000 \div 100$ seen or implied by 400	Condone $40\,100 \div 10^2$ or $40\,100 \div 100$ seen or implied by 401 for B1
	(b)		$5\dfrac{5}{6}$ cao	3	**B2** for $5\dfrac{10}{12}$ or $\dfrac{70}{12}$ oe isw **Or M1** for $\dfrac{10}{3}$ or $\dfrac{7}{4}$ oe	E.g. $\dfrac{840}{144}$ E.g. $\dfrac{40}{12}$ or $\dfrac{21}{12}$

10	(a)		p^8	1		
	(b)		p^{-4}	1		
	(c)		p^{12}	1		
11			$y = \tfrac{1}{2}x - 2$ oe	3	**B2** for $y = \tfrac{1}{2}x + c$ any c oe or for $y = mx - 2$ any $m \neq 0$ oe **Or B1** for (gradient =) $\tfrac{1}{2}$ oe **Or SC2** for $\tfrac{1}{2}x - 2$ oe **Or SC1** for $\tfrac{1}{2}x + c$ any c oe Or for $mx - 2$ any $m \neq 0$ Or for $y = -2x + \tfrac{1}{2}$ oe	DO NOT accept $+ -2$ as -2
12			$x = \tfrac{1}{2}$ $y = \tfrac{1}{2}$ nfww	3	**B2** for one value correct nfww **Or M1** for equalising coefficients of x or y Or for correctly isolating x or y from one of the equations E.g. $y=3x - 1$	At least 2 terms correct in each equation
13	(a)		3	1		
	(b)		$3\sqrt{2}$	2	**M1** for $\sqrt{18}$ or $\sqrt{9}\,\sqrt{2}$	$\sqrt{2}\,\sqrt{3}\,\sqrt{3}$ is not enough for M1
	(c)		$2\sqrt{3}$	2	**M1** for $\dfrac{6}{\sqrt{3}} \times \dfrac{\sqrt{3}}{\sqrt{3}}$ or better	

14	(a)		$x^2 + 2x - 8$ final answer	2	**M1** for any three of x^2, $+4x$, $-2x$, -8 soi	Ignore =0 in their final answer
	(b)		$5x(2x + y)$ or $5x(2x + 1y)$ Final answer	2	**M1** for $x(10x + 5y)$ or $5(2x^2 + xy)$ **Or SC1** for $2x(5x + 2.5y)$ Or for $10x(x + 0.5y)$	Condone for 2 marks $(5x + 0)(2x + y)$ etc and $(x + 0)(10x + 5y)$ etc for 1 mark. Condone missing final bracket.
	(c)		$(2x - 3)(x + 5)$	M1		Condone missing final bracket.
			-5	A1		

			$1½$ or 1.5 or $\dfrac{3}{2}$	A1	**After M0**
					 SC1 for answers -5 <u>and</u> $1½$ or 1.5
					                      or $\dfrac{3}{2}$
					    Or for answers 5 <u>and</u> $-1½$ or -1.5
					                      or $-\dfrac{3}{2}$	

15	(a)	(i)	(0, 6,) 30, 74, 94, 99, (100)	1		
		(ii)	7 correct points correctly plotted ± ½ small square	2	**B1** for any 4 correct points correctly plotted ± ½ small square	Histogram only scores 0. For 2 marks, condone omission of point at (1h, 0) If points plotted and histogram drawn, ignore the histogram for plotting marks Ignore graph to the left of (1h 10min, 6)
			Join *their* 7 points (lines or curve)	FT1	Only for continually increasing graph. Within ½ small square of point **FT0** for joins if histogram and graph	
		(iii)	12 to 16 dep.	2	Dependent on a 'cf graph' drawn **B1** for 84 to 88 seen **Or M1** for using 1h 35m <u>and</u> a 'cf graph'	Ignore any histogram E.g. dot on cf graph above 1h 35m **or** line from 1h 35m to cf graph and across to vertical axis **or** dot on vertical axis appropriate for their cf graph
	(b)	(i)	Bar 0-10 and 12 small sq high Bar 10-20 and 45 small sq high ONE bar 20-50 6 small sq high	1 1 M1 A1		Allow freehand Intention to draw at these heights
		(ii)	X = 15 Y = 10	1 1	**After 0** **SC1** for X = 10, Y = 15	
16	(a)		245	1		

	(b)		Using (card max) 10.55 Using envelope (min) 10.5 Will not always fit	1 1 1	Or 10.5 clearly associated with envelope **Dependent** on previous 2 marks gained For all 3 marks accept a correct counter example. EG 'A card could measure 10.53 cm and this would not fit into an envelope measuring 10.5 cm.	Condone 10.549(99…) NOT comparing areas or perimeters
17			$\frac{32}{72}$ oe isw nfww	4	**M2** for $\frac{4}{9} \times \frac{3}{8} + \frac{5}{9} \times \frac{4}{8}$ **Or M1** for $\frac{4}{9} \times \frac{3}{8}$ or $\frac{5}{9} \times \frac{4}{8}$ **AND A1** for $\frac{12}{72}$ or $\frac{20}{72}$ oe **Or SC2** for answer $\frac{32}{81}$ or $\frac{41}{81}$ or $\frac{41}{72}$ isw **Or SC1** for 6 correct probabilities correctly placed on a tree diagram	Ignore incorrect cancelling after a correct answer given. Answer of $\frac{4}{9}$ needs evidence of correct work.
18	(a)	(i)	6 right, 2 up – arrow pointing 'NE'	1	**In (a)** −1 once for no/wrong arrows Lines within 2mm of correct endpoints	Allow freehand
		(ii)	6 left – arrow pointing 'W'	1		
		(iii)	5 right, 1 up – arrow pointing 'NE'	1		
	(b)	(i)	2**b** + **a** or **a** + 2**b**	1		
		(ii)	**b** − **a** or −**a** + **b**	1		

		(iii)	$5a - b$ or $-b + 5a$	1		

**** Check Page 24 for further work and tick ****

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

OCR Customer Contact Centre

14 – 19 Qualifications (General)
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance
programme your call may be recorded or monitored