

Mathematics A (Two Tier)

General Certificate of Secondary Education

Component **J512/02**: Paper 2

Mark Scheme for June 2011

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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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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 $180 \times (\textit{their} '37' + 16)$, or FT $300 - \sqrt{(\textit{their} '5^2 + 7^2')}$. Answers to part questions which are being followed through are indicated by eg FT 3 $\times \textit{their} (a)$.

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, 2)	1		
	(b)	(2, 1)	1		
	(c)	[D] plot at (1, 4)	1		Within 2 mm Ignore other points
2	(a)	C	1		
	(b)	D	1		
	(c)	B and E	1		
	(d)	A and D and F	1		
	(e)	the sides/angles are not all the same	1	Accept because it is isosceles	Acceptable answers: In an equilateral triangle all the sides/angles are the same size (implicit) Bottom side is shorter They are not all the same
3	(a)	9	1		
	(b)	16	1		
	(c)	-13	1		
4		£17.60 or 1760 p[ence]	3	Mark final answer M2 for 77.4[0] or figs(176) or 95 - 47.5 - (14.95 × 2) M1 for 47.5 + (14.95 × 2) or for 29.9[0] Or SC1 for 32.55	

5	(a)		1415	1		
	(b)		246	1		
	(c)		27.1	1		Accept -27.1
	(d)		218	2	B1 for sight of 164	
	(e)		2.8 or 14/5 oe	1		
6	(a)		10 dots in a 2×5 pattern of squares or 4 squares (with no dots) in a line	1		Do not accept a 1×4 rectangle with no internal squares Allow enlarged squares but not rectangles
	(b)		10	1		
	(c)	(i)	12	1		
		(ii)	26	2	M1 for $12 \times 2 + 2$ or $10 + 8 \times 2$ or $12 + 7 \times 2$ oe	
	(d)		Because it is an odd number oe	1		Acceptable answers: because it will always be an even number (implicit), it isn't in the two times table, the number of dots will always be even, the pattern is even, isn't a multiple of 2 Not acceptable: Goes up by 2 each time
7	(a)		$1\frac{1}{2}$ large squares drawn (6 small squares)	1		Squares do not have to be ruled

	(b)		5	1		
	(c)		13	1		
8			30.6 cm ²	2 1	M1 for 6.8×4.5	Accept 3060 and mm ² for all 3 marks
9	(a)		Reflected triangle correct and ruled	2	B1 for 1 side correctly placed or unruled	Within 2 mm
	(b)		Triangle drawn accurately Angles 66° and 43° ($\pm 2^\circ$), Line 7.8cm (± 0.1) (Triangle formed with two correct angles on the correct base)	3	M2 for 2 angles correct or base and 1 angle correct M1 for 1 angle or base correct	Triangle does not need to be completed for M marks
10	(a)		632	2	M1 for 1.58×400	
	(b)		75.94 or 75.95	2	Mark final answer M1 for $120 \div 1.58$ or figures 759[...] or answer of 76	Accept 7594 p[ence] or 7595 p[ence] clearly labelled
11	(a)		540	2	M1 for 360×1.5 oe	
	(b)		3½ oe	2	M1 for $1260 \div 360$	
12	(a)	(i)	25	1		
		(ii)	16.25 or 16.3	2	M1 for $143 \div 880 \times 100$ or sight of 0.1625 or answer of 16 with no method shown	
	(b)		207	2	M1 for 0.46×450 oe or $45 \times 4 + 4.5 \times 6$ or $45 \times 4 + 22.5 + 4.5$	
13	(a)		6	2	B1 for sight of $\frac{1}{4}$ oe or $\div 4$	

	(b)	(i)	$114/360$ oe (=19/60) or 0.31[6...] or 0.32 or 31/100 or 32/100	1	isw	
		(ii)	7.6 oe or 7 hours 36 minutes or 456 minutes	2	isw M1 for $114 \div 360 \times 24$ or <i>their</i> (b)(i) $\times 24$ seen	
14	(a)		$425/797$ or 0.53[...] or 53%	2	B1 for $425/n$ or $n/797$ seen or 425 in (out of) 797	Do not accept ratios Ignore likely, unlikely etc with correct answer on the answer line in both parts
	(b)		$5/797$ or 0.006[...] or 0.6%	1FT	FT from <i>their</i> denominator in (a) providing it is not 425 or 372	
15	(a)	(i)	$2 \times (L[\text{length}] + W[\text{width}])$ or $L[\text{length}] + L[\text{length}] + W[\text{width}] + W[\text{width}]$ Or $2 \times \text{length} + 2 \times \text{width}$	1		Accept explanation using words or algebra Do not accept: there are two lengths and two widths (there must be some reference to adding)
		(ii)	3.5	3	M2 for $(23 - 2 \times 8) \div 2$ Or M1 for $23 - 2 \times 8$ soi or sight of 7	
	(b)	(i)	$5m$ or $5 \times m$ or $m \times 5$	1	Mark final answer Accept P = $5m$ but not $m = 5m$ etc	Condone $m5$ Accept 5M etc in all three parts
		(ii)	$4t + 6$ or $6 + 4t$	1	Mark final answer Accept P = $4t + 6$ but not $t = 4t + 6$ etc	Do not accept $t4 + 6$ etc $4 \times t + 6$ is <u>unsimplified</u>
		(iii)	$3x + 2y$ or $2y + 3x$	1	Mark final answer Accept P = $3x + 2y$ SC1 for b(ii) and b(iii) - two correct expressions seen, unsimplified or with $t4$ or $x3$ or $y2$	

16	(a)	(i)	43	1		
		(ii)	Fourth number = 17 Second number = fourth number – 10 First number = 10 – second number	1 1 1		
	(b)		$n + 6$ $2n + 9$	1 1	FT $n+3 + their (n+6)$ simplified SC1 for two correct expressions but unsimplified	Condone $n^2 + 9$
17			50	3	M2 for $360 - 70 \times 3$ or sight of 150 Or M1 for 70×3 soi OR M2 for $360 \div 3 - 70$ Or M1 for $360 \div 3$ soi	Check nfw
18			568.75 81.25	2	M1 for $650 \div 8$ can be implied by either correct answer seen	Accept correct answers in either order
19	(a)		2.4	2	B1 for 2.3(6....) or 2.37 Or SC1 for 12.7	12.7 is from rounding to 1dp following incorrect use of calculator
	(b)		3.9 oe	2	M1 for $\sqrt{15.21}$	Condone for M mark 15.21

20			74.5% or $74\frac{1}{2}$	4	<p>M3 for $(40 - (2 + 0.85 + 4.2 \times 1.75)) \div 40 \times 100$ or $100 - ((2 + 0.85 + 4.2 \times 1.75) \div 40 \times 100)$ or 0.745 Or M2 for $40 - (2 + 0.85 + 4.2 \times 1.75)$ or 29.8(0) or 2980 or $(2 + 0.85 + 4.2 \times 1.75) \div 40 \times 100$ or 25.5% Or M1 for $2 + 0.85 + 4.2 \times 1.75$ or 10.2(0) or 1020</p> <p>If M0 then SC2 for <i>their</i> profit $\div 40 \times 100$ Or SC1 for $((2 + 0.85 + 4.2) \div 40) \times 100$</p>	<p>Check nfw May be done in stages Accept T & I method if final answer 74.5% Accept T & I method for M2 if 25.5% Ft their arithmetic errors for M marks provided earlier method seen</p> <p>Eg $(40 - (2 + 0.85 + 4.2)) \div 40 \times 100$ or $100 - (((2 + 0.85 + 4.2) \div 40) \times 100)$ or 82.375 scores SC2 17.625 scores SC1</p>
21			45	4	<p>M3 for $5x = 225$ or $225 \div 5$ or $(360 - 135) \div 5$ Or M2 for $5x + 135 = 360$ or $x + x + 3x = 225$ or $5x$ and 225 seen or $5x$ and $360 - 135$ seen Or M1 for $x + x + 135 + 3x = 360$ or 225 seen or $360 - 135$</p>	<p>Check nfw 180 – 135 on its own scores 0 marks 135 $\div 3$ on its own scores 0 marks</p> <p>However an answer of 45 with NO working scores full marks</p> <p>In general any correct working will have 360 soi (can be implied from 225 seen)</p>
22	(a)		A	1		
	(b)	(i)	$60 < t \leq 80$	1		<p>Allow any indication of correct class eg 60 – 80 Do not allow '12' or '4th class' or '70'</p>

		(ii)	61.25 oe	4	<p>M2 for $(10 \times 1 + 30 \times 4 + 50 \times 10 + 70 \times 12 + 90 \times 3 + 110 \times 2) \div 32$</p> <p>Or M1 for sum frequency \times time where time is within correct class</p> <p>AND B1 for 5 or 6 midpoints correct</p> <p>If no working SC3 for an answer 61 minutes 25 seconds</p>	<p>Allow 61 minutes 15 seconds</p> <p>Condone 61 or 61.3 provided method shown</p> <p>For M marks condone lower bound for correct class</p> <p>For M2 condone one error in products (nb: sum may be outside range 1640 – 2280)</p> <p>If products not seen for M2 allow <i>their</i> sum \div 32 provided <i>their</i> sum in range 1640 – 2280</p> <p>For M1 allow for the sum at least 3 frequency \times time (can be implied by 1640 – 2280)</p> <p>For B1 midpoints correct are implied by 1960 seen or by 5 or 6 correct products</p>
	(c)	(i)	No effect oe	1		
		(ii)	Increase oe	1		Ignore any recalculations of the mean
23	(a)		424 – 424.3	3	<p>M2 for $15 \times \pi \times 3^2$</p> <p>Or M1 for $\pi \times 3^2$ or 28.27(...)</p> <p>If M0 then SC1 for $15 \times \pi \times 6^2$</p>	Condone 423.9
	(b)		[½ litre =] 500 (ml or cm ³) and No	1FT	Strict FT <i>their</i> (a)	

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