GCSE

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education

Unit **B278:** Module M8 (Sections A&B)

Mark Scheme for June 2011

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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 <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.
    W marks are <u>workless</u> marks, which are independent 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 **W** marks. Deduct 1 mark from any **A** or **W** 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.

Section A

Question			Answer	Marks	Part marks and guidance	
1	(a)		$x = \dfrac{1+y}{2}$ oe	2	**M1** for $6x - 4x = 1 + y$ oe or better or **SC1** for answer of $x = \dfrac{1-y}{2}$ or $x = \dfrac{y}{2}$ or $\dfrac{1+y}{2}$	allow $2x = 1 + y$ or $2x - y = 1$ **2** for $x = \dfrac{-1-y}{-2}$
	(b)		(i) $-\dfrac{1}{3}$ or $^-0{\cdot}33(3...)$	3	**M1** for first stage eg $3\frac{1}{2}x + 1\frac{1}{2} = 2x + 1$ or $7x + 3 = 2(2x + 1)$ oe **M1** for collecting x's on one side and numbers on the other FT *their* first step **M1** for $x = b/a$ FT *their* 2nd step $ax = b$ for $a \neq$ 1, -1, 0 or b	condone incorrect attempts to simplify the correct answer and allow $\dfrac{1}{^-3}$ if the answer is incorrect award a maximum of 2 marks
			(ii) $(x + 7)(x - 3)$ <u>and</u> $^-7$ and 3	3	**M2** for $(x + 7)(x - 3)$ **or** **M1** for $(x \pm 7)(x \pm 3)$ or for factors which give two correct terms and **A1** (dep on M1 or M2) for the correct solutions FT their factors if **0** scored award **SC1** for answers $^-7$ and 3	allow one pair of factors seen even on a grid without brackets
2	(a)		Correct rotation	2	**M1** for correct rotation about wrong centre or correct clockwise rotation	points at (0, 2), (–3, 2), (–2, 4) allow ± 2mm by eye condone unruled lines
	(b)		Correct translation	2FT	strict FT *their* B **M1** for either component correctly done (FT *their* B)	points at (–1, –3), (–4, –3), (–3, –1) allow ± 2mm by eye condone an extension of the grid and unruled lines

Question			Answer	Marks	Part marks and guidance	
	(c)		3 ⁻2	1	cao	
3			$\dfrac{55}{6}$ or $9\dfrac{1}{6}$	3	**M1** for $\dfrac{5}{2}$ or $\dfrac{11}{3}$ oe seen **M1** for $\dfrac{5 \times 11}{2 \times 3}$ oe attempted, FT *their* two improper fractions	condone attempts to simplify the improper fraction eg allow $\dfrac{55}{6} = 9\dfrac{1}{3}$ scores 3 even if eg their improper fractions are converted to a common denominator incorrectly
4			$15x + 6y = 12$ $15x - 25y = 105$ correctly adding or subtracting the two equations e.g. $31y = ⁻93$ $x = 2$ and $y = ⁻3$	M1 M1 M1dep A1	First equation needs to be multiplied by either 3 or 5, Second equation needs to be multiplied by either 5 or 2, allow one error in each of the three steps accept any correct method eg: **M2** for first equation ×2·5 or **M2** for correct substitution (one error in rearranging) then **M1dep** for simplifying equation **SC1** for correct answer and no supporting working	It could be multiples of these i.e. first ×6, second ×10 Dep on at least one M1 above and a variable with equal coefficients (ignore sign) Mark their best attempt
5	(a)		fully correct box plot	2	**M1** for at least three of the elements (lowest, LQ, M, UQ, highest) plotted correctly even if just lines	mark intent, if the box plot is in 'B' award 2 if lines are clear else **M1**
	(b)		1·8	1		

Question			Answer	Marks	Part marks and guidance	
	(c)		Two correct comments: Comment about the 'average' *or* about the 'spread' *or* about the 'min A or B or max A' and at least one should be in context	1,1	Examples are 'School A has a higher median.' and 'School A has a higher spread/range/IQR of distances.' For 2 marks, must see one reference to context: either distance/travelled/miles/walked/closeness	There are three categories; the two statements cannot be from the **same** category mark the best statement within a comment and do not reward a contradictory statement condone 'mean' used for median no comment about LQ or UQ

Section A Total: 25

Section B

Question		Answer	Marks	Part marks and guidance	
6	(a)	1648·65 — 1648·70 or 1648 or 1649	3	**M2** for 1500 × 1·032³ or 148.65 — 148.70 or the correct answer seen in working accept any correct equivalent method eg year by year or **W1** for 1·032 soi (eg 1548, 1500 + 3×48) or 1500 × 1·32³ or 1500 × 1·03³ or 3449.952 rot	Condone more than 2 dp or 1 dp in final answer eg Y1: 1548 Y2: 1597.536 rot or 2 out of 3 interests correct (48, 49.536, 51.12 rot) added to 1500.
	(b)	210 000	3	**M2** for 193 200 ÷ 0·92 or **M1** for 0·92 or 92 seen	
7	(a)	D (and) F only	1		
	(b)	They have the same (or equal) gradient/coefficient of '*x*'/steepness	1	Accept any correct phrase that expresses this reason, any figures quoted must be correct (ie -3 or -3x) and with no contradictions	
8	(a)	volume length	1 1	only one tick in each line	
	(b)	No **and** *xy* is an area [but] 3*r* is a length [you cannot subtract a length from an area]	1	Statements must be correct ie 3r is a volume scores 0	
9	(a)	Correct tree diagram	2	**W1** for (0)·58 on 'first shot' **W1** (0)·42 and *their* (0)·58 in correct places in 'second shot'	
	(b)	(0)·176(4) or (0)·18 oe	2	**M1** for branches 0·42 and *their* 0·42 identified or answer 17·6(4) or 18	0·42 + *their* 0·42(*score*) scores **M1** 0·84 on its own scores 0

Question			Answer	Marks	Part marks and guidance	
10	(a)		9 395 000 or 9·3(95) × 10^6 oe	1	accept 9 390 000, 9 400 000 or 9.4 × 10^6	Accept 9395 x 10^3
	(b)		136 − 137 oe **and** 251 − 252 oe **and** UK/Britain/England (or China has lower)	4	(China :) **M1** (1·32×10^9)÷ (9·64×10^6) soi (UK :) **M1** (6·16×10^7)÷ (2·45×10^5) soi **A1** 136 - 137 or 251 - 252 alternative **SC1** (China :) (9·64×10^6) ÷ (1·32×10^9) = 0·0073(0..) **SC1** (UK:) ((2·45×10^5) ÷ (6·16×10^7)) = 0·0039(7..) **and SC2**(dep on correct answers) UK	implied by correct answer or figs 132 ÷ 964 etc look for correct answers first implied by correct answer or figs 964 ÷ 132 etc
11	(a)		Correct statements showing ∠ABC = 90°	2	**W2** 124°− 34° = 90° or **W1** for ∠CBN = 34° **W1** for ∠ABN = 56° and (56° + 34° = 90°) or **W1** ∠CAB = 34° **W1** ∠ACB = 56° and (180° - 56° - 34° = 90°)	maybe on diagram
	(b)		80·8 − 80·9 or 81	3	**M1** for cos 34 = 67 ÷ AC or sin 56 = 67 ÷ AC or a correct trig statement from *any* triangle **M1** for AC = 67 ÷ cos 34 or AC = 67 ÷ sin 56 allow any correct method eg sine rule or separate triangles (X is where BN meets AC) AX = 67 cos 34 = 55·5(455..) **M1** BX = 67 sin 34 = 37·4(659..) XC = 37.4659.. × tan 34 = 25.2(71…) **M1** AC = 55·5455.. + 25.271… = 80.81.. **A1**	eg sin 34 = BC ÷ AC or tan 34 = BC ÷ AB/67 or sin 34 = opp ÷ 67 *their* triangle may have the wrong angles marked but must be clear ie. Correct expression for AC= ……

Section B Total: 25

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