OCR
RECOGNISING ACHIEVEMENT

GCSE

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education

Unit **B277:** Module M7 (Sections A&B)

Mark Scheme for January 2011

Oxford Cambridge and RSA Examinations

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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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Marking instructions for examiners (January 2011)

GCSE Mathematics C (Graduated Assessment) – J517
Units B271 to B282

Marking instructions

1. Mark strictly to the mark scheme. If in doubt, consult your team leader using the messaging system within *scoris*, e-mail, or by telephone.

2. Make no deduction for omission of units except as indicated on the mark scheme (although if this leads to a later error this will of course be penalised).

3. Work crossed out but not replaced should be marked.

4. **M** (method) marks are not lost for purely numerical errors.
A (accuracy) marks depend on preceding M (method) marks. Therefore M0 A1 cannot be awarded.
W (workless) marks are independent of M (method) marks and are awarded for a correct final answer or a correct intermediate stage.

5. Subject to 4, two situations may be indicated on the mark scheme conditioning the award of A marks or independent marks:
   i. Correct answer correctly obtained (no symbol)
   ii. Follows correctly from a previous answer whether correct or not ("FT" on mark scheme and on the annotations tool).

6. 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).

7. Always mark the greatest number of significant figures seen, even if this is then rounded or truncated on the answer line, unless the question asks for a specific degree of accuracy.

8. i. Allow full marks if the correct answer is seen in the body and the answer given in the answer space is a clear transcription error, unless the mark scheme says 'mark final answer' or 'cao'.
   ii. Allow full marks if the answer is missing but the correct answer is seen in the body.
   iii. Accuracy marks for an answer are lost if the correct answer is seen in the working but a completely different answer is seen in the answer space. Method marks would normally be given.

9. 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.

10. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work.

11. For answers scoring no marks, you must either award NR (no response) or 0, as follows:

    Award NR if:
    - Nothing is written at all in the answer space
    - There is a comment which does not in any way relate to the question being asked ("can't do", "don't know", etc.)
    - There is any sort of mark that is not an attempt at the question (a dash, a question mark, etc.)

    Award 0 if:
    - There is any attempt that earns no credit. This could, for example, include the candidate copying all or some of the question, or any working that does not earn any marks, whether crossed out or not.

12. Where a follow through (FT) mark is indicated on the mark scheme for a particular part question, you must ensure that you refer back to the answer of the previous part question.

13. In cases where there is clear evidence that a calculator has been used in section A, mark the script as normal then raise an exception.

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.

Abbreviations

The following abbreviations are commonly found in GCSE Mathematics mark schemes.

- Where you see **oe** in the mark scheme it means **or equivalent.**
- Where you see **cao** in the mark scheme it means **correct answer only.**
- Where you see **soi** in the mark scheme it means **seen or implied.**
- Where you see **www** in the mark scheme it means **without wrong working.**
- Where you see **rot** in the mark scheme it means **rounded or truncated.**
- Where you see **seen** in the mark scheme it means that you should award the mark if that number/expression is seen anywhere in the answer space, including on the answer line, even if it is not in the method leading to the final answer.
- Where you see **figs 237**, for example, this means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point e.g. 237000, 2·37, 2·370, 0·00237 would be acceptable but 23070 or 2374 would not.

Section A

1	**(a)**	Negative, -ve	**1**	Ignore strong, weak, correlation, etc	Do not allow –
	(b)	ruled line of best fit	**1**	line must pass through or between (40,51) and (40,58) AND between (75,25) and (75,30)	
	(c)	read off at x = 50 from *their* attempt at a straight line of best fit	**1**	Line of best fit must have negative gradient, need not be ruled for this mark	e.g. reading between 45 and 46, accept 45 or 46 reading at 46, accept 46 only
2	**(a)**	$^{-}5$ and 5	**1**		
	(b)	(i) 5^{12}	**1**		
		(ii) 5^{6}	**1**		
	(c)	$0\dot{4}\dot{5}$ or 0·4545… as final answer	**2**	**M1** for first two decimal places correct	For 2 marks decimal must not terminate
3	**(a)**	$C = 0{\cdot}14 \times n + 18$ oe	**2**	**W1** for $0{\cdot}14n$	condone appearance of £ signs in formula
	(b)	$(n =) \dfrac{C - 15}{0{\cdot}2}$ or $5C - 75$	**2**	**W1** for $0{\cdot}2n = C - 15$ or $\dfrac{C}{0{\cdot}2} = n + 75$ or answers of $\dfrac{\pm C \pm 15}{\pm 0{\cdot}2}$ or $\pm 5C \pm 75$	
4		$x^2 + 4x - 7x - 28$ isw or $x^2 - 3x - 28$ isw	**2**	**M1** for any 3 terms correct or any 2 correct from 3 term final answer of $x^2 - 3x - 28$ Condone +–28, etc	For M1 accept three terms correct in grid NB $x^2 - 28$ only scores M0

5	**(a)**	72	**1**	Accept $\frac{72}{6} = 12$	Do not accept $\frac{72}{6}$
	(b)	$4y + 6$ (= 11) <u>or</u> $2y + 3 = 5{\cdot}5$ $4y = 11 - 6$ or 5 <u>or</u> $2y = 5.5 - 3$ or $2{\cdot}5$ $y = 1¼$ or $\frac{5}{4}$ or $1{\cdot}25$ isw	**M1** **M1** **M1**	 correct or FT from error in first step correct or FT from *their* $ax = b$, $a \neq 1$ Allow **W3** for $1{\cdot}25$ as final answer NB $(y =) \frac{11-6}{4}$ scores M1 M1 M0	M marks are for **correct** steps; **first M1** is for correct expansion of brackets or for correct division by 2. **Second M1** is for correct collection of terms FT *their* equation with brackets dealt with. **Third M1** is for correctly obtaining x FT *their* $ax = b$; do not accept b/a unsimplified if it is equivalent to an integer. eg accept 5/4 but not 6/2. award W3 for $2(2 \times 1{\cdot}25 + 3) = 11$ complete, correct reversed flowchart scores M2 if answer not $1{\cdot}25$ then maximum M2 only
6	**(a)**	(i) Multiplying by **number > 1** should **increase the value/answer** **or** Answer should have two decimal places **or** Last digit should be 2 **or** Use of approximation (18×1 or $18{\cdot}6 \times 1$ only)	**1**	Both **bold** elements must be mentioned if using this approach. Accept $1{\cdot}2$ for **number greater than 1** Eg $18{\cdot}6 \times 1 = 18{\cdot}6$ so the answer should be more than $18{\cdot}6$	 Use of approximation must include a comment about the result and must show the values being used.
		(ii) Use of approximation Decimal answer	**1**	Use of approximation must include a comment about the result and must show the values being used. If evaluated the answer must be correct. Eg $5 \div 0{\cdot}5$ (= 10) so the answer is too big Eg $0{\cdot}4 \times 120$ (= 48) which is bigger than $4{\cdot}88$ Because $0{\cdot}4 \times 122$ will have one decimal place	Accept double or treble as evidence of dividing by $0{\cdot}4$

	(b)	$\frac{5}{2}$ or 2·5 or 2½	**1**		
7		bisector of ∠A with two sets of arcs	**2**	allow **1** for correct bisector with no arcs or for no bisector but both sets of arcs	Accept dots on AB and AD as arcs. Condone dotted line
		arc, radius 7cm (± 2mm), centre C	**1**	If 0 for bisector OR 0 for circle then SC1 for line through A, arc centred at C and with appropriate shading	
		correct shaded region	**1**		

Section A Total: 25

Section B

8	**(a)**	75	**1**		
	(b)	(£)2·05(p)	**2**	**M1** for $\frac{4{\cdot}92}{60} \times 25$ or figs 205 or 0·082	
	(c)	22·5 (ignore subsequent rounding)	**2**	**M1** for $\frac{3}{\textit{their}\ '10'} \times 75$ or figs 225 **or** **SC1** for answer of 15 or 37·5	Unsupported 23 scores 0
9		midpoints soi their midpoints × frequencies attempt at $\sum fm \div 49$ (2921 ÷ 49) 59·6 isw www	**M1** **M1** **M1** **A1**	at least 3 of 57, 59, 61, 63, 65 at least 3 of (f × their m) correct, soi Allow M1 for endpoints × freq dep on 2nd M1 allow **W4** www **A1** dependent on M3	 allow FT for *their* midpoints only in the interval (correct *fm* values are 228, 1947, 488, 63, 195) - these can also imply the first M1 use of endpoints can earn 2nd and 3rd M marks eg answers 58·61 and 60·61 imply M0, M1, M1 accept *their* attempt at ∑f (under table) if 49 not used 2921 seen implies M2 59·61(…) implies M3
10		1·7 or 1·75 www	**4**	**W3** for 1·74(6…) Or **M2** for $\sqrt{(1{\cdot}6^2 + '0{\cdot}7'^2)}$ Or **M1** for $1{\cdot}6^2 + '0{\cdot}7'^2$ or 3·05 OR **SC M1** for $\sqrt{(1{\cdot}6^2 - '0{\cdot}7'^2)}$ or $\sqrt{(2{\cdot}07)}$ or 1·43(8…) or 1·439 **A1** for 1·4 or 1·44	NB method marks may be earned from trig - for **M2** completely correct method must be seen. Must see evidence for *their* '0.7' eg 2.5 – 1.8 = 1.7 (then used as '0.7') 0 for scale drawing

11	**(a)**	$\frac{26}{80}$ or $\frac{13}{40}$ or 0·325 or 32.5% isw	**1**		
	(b)	(i) sample size is large or sample is random	**1**		
		(ii) 390	**2**	**M1** for their $\frac{26}{80}$ × 1200 or 26 x 15	Condone answer of $\frac{390}{1200}$
12		153·4 - 153·7 or 153 or 154 www	**4**	**M3** for $8{\cdot}4^2 + 3 \times ½ \times \pi \times 4{\cdot}2^2$ Or **M2** for 27·6 - 27·72 or 82·8 - 83·2 or $8{\cdot}4^2$ **and** $3 \times ½ \times \pi \times 4{\cdot}2^2$ Or **M1** for $8{\cdot}4^2$ or 70·5(6) or 70·6 or $½ \times \pi \times 4{\cdot}2^2$ or 55·3 - 55·45 Or **SC3** for 402·8 - 403·1 Or **SC2** for answer 236·7 - 236·9	Complete method one or three semi-circles evaluated expression for square **and** semi-circle area of square expression for semi-circle or area of circle incorrect radius used square plus three whole circles correctly evaluated

13

Correct trial from $2 < x < 3$ — **M1**

Correct trial from $2{\cdot}7 \leq x < 3$ correctly trialled — **M1**

Correct trial from $2{\cdot}77 \leq x \leq 2{\cdot}8$ **and** one from $2{\cdot}75 \leq x \leq 2{\cdot}76$ — **M1**

Values required, rounded or truncated to at least 1 dp

x	$x^3 - 4x$
2·1	0·861
2·2	1·848
2·3	2·967
2·4	4·224
2·5	5·625
2·6	7·176
2·7	8·883
2·8	10·752
2·9	12·789

Answer 2·8 — **W1**

2·8 with no correct trials scores 1 only

SC
Correct trial from $2{\cdot}77 \leq x \leq 2{\cdot}8$ **and** one from $2{\cdot}75 \leq x \leq 2{\cdot}76$ **and** answer of 2·8 scores all 4 marks

x	$x^3 - 4x$
2·71	9·062
2·72	9·243
2·73	9·426
2·74	9·610
2·75	9·796
2·76	9·984
2·77	10·173
2·78	10·364
2·79	10·557

x	$x^3 - 4x - 10$
2·1	– 9·139
2·2	– 8·152
2·3	– 7·033
2·4	– 5·776
2·5	– 4·375
2·6	– 2·824
2·7	– 1·117
2·8	0·752
2·9	2·789

x	$x^3 - 4x - 10$
2·71	– 0·937
2·72	– 0·756
2·73	– 0·573
2·74	– 0·389
2·75	– 0·203
2·76	– 0·015
2·77	0·173
2·78	0·364
2·79	0·557

Section B Total: 25

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