GCSE

Mathematics C (Graduated Assessment)

General Certificate of Secondary Education

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

Mark Scheme for March 2011

Marking instructions for examiners (March 2011)
GCSE Mathematics C (Graduated Assessment) – J517
Units B272 to B280

1.   Mark strictly to the mark scheme.

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)	$2(x + 1)$ or $2x + 2$	1		$x + 1 \times 2$ does not score
	(b)	-4	3	<u>If 1 in (a)</u> **M1** for $5x + 14 = 2x + 2$ **M1** for $3x = -12$ FT *their* 1st step **M1** for $x = -4$ FT *their* 2nd step <u>If 0 in (a)</u> then FT max **M3** for $5x + 14 = kx + m$ or FT max **M2** for $5x + 14 = kx$ or FT max **M2** for $5x + 14 = m$. Final M1 FT from $kx = m$ ($k \neq 1$)	Eg after (a) correct $5x + 14 = 1 + 2x$ scores M0 $14 - 1 = 2x$ -5x $13 = -3x$ scores M1 $x = 4.3$ Scores M0 eg (a) $5x + 14 = 2x + 1$ M1 for $3x + 14 = 1$ FT *their* (a) then M1 for $3x = -13$ FT *their* 1st step then M1 for $x = -13/3$ isw FT *their* 2nd step (or -4.33...)
2		12 and 13	3	**M2** for $\sqrt{152}$ seen Or **M1** for 125 or 27 seen	12^2 and 13^2 or 144 and 169 implies $\sqrt{152}$ seen
3	(a)	4 points plotted ±1mm	1	Condone 1 error	(45,290) (49,265) (63,325) (65,355)
	(b)	positive	1	Condone 'as age increases, time increases'.	
	(c)	(i) line drawn	1	line between (20, 180) to (20, 205) and (60, 320) to (60, 350)	
		(ii) reading FT *their* line	1	 If scale misread in (a) then allow their FT reading in (c)(ii)	accept reading 'within the square' Only FT if 0 scored in (a). Likely evidence of misread is (45,290) plotted at (45,280)

4	(a)	3, 8, 13	2	**M1** for 2 terms correct (correct position) or -2, 3, 8	Allow M1 for 3n, 8n, 13n
	(b)	12th	1	Condone complete embedded solution. SC1 Allow 12 or 13 for -2, 3, 8	eg 58 = 5 × 12 - 2
	(c)	explanation eg if $5n - 2 = 99$ then $5n = 101$ and 101 is not a multiple of 5.	1		Accept 'units digit not 3 or 8' Accept 5 x 20 - 2 = 98
5	(a)	C	1		
	(b)	A is wrong because multiplying by less than 1 gives answer smaller than 31·4 B is wrong because dividing by less than 1 gives answer greater than 21·4	1 1	Condone omission of either 'multiplying by less than 1' or 'answer smaller than 31·4' Condone omission of either 'dividing by less than 1' or 'answer greater than 21·4'. If 0 and 0 then SC1 for 'A answer smaller and B answer bigger' (ie not referring to 31.4 and 21.4.	Allow 30 × 0·4 = 12 or half of 31 is 15.5 Allow 21/0·7 = 30
6	(a)	$\dfrac{4}{15}$ $\dfrac{9}{20}$ $\dfrac{3}{5}$	1		Accept 'their' equivalent fractions
	(b)	0·166... or 0·1666 or better	2	**M1** for 0·16 or 0.167 Or figs 166[6...]	Accept 0.16 with dots above both 1 and 6 for M1

7	(a)	Angle bisector constructed with two pairs of arcs – accept angles between 58 and 63	2	**M1** for bisector in tolerance but no arcs Or M1 for arcs drawn but not joined to B	Condone short bisector.
	(b)	Arc radius 5cm tolerance ± 2mm centre A	1		Condone arc of at least half the length of full arc. **If in doubt check arc using ruler.**
		region	1	FT *their* bisector	For region condone line drawn up to 10 mm short but arc must be complete.

Section A Total: 25
Section B

8	(a)	$\dfrac{7}{32}$	2	**M1** for 1/32 or 6/32	Incorrect notation eg 7 out of 32, 7 in 32, 7: 32 scores 1 If eg 7/32 and 7 out of 32 award 2
	(b)	413 www	3	**M1** for 5 × 100·5 [+] 12 × 300·5 [+] 8 × 500·5 [+] 6 × 700·5 [+] 1 × 900·5 attempted and **M1** for 13216 ÷ 32 or *their ∑fm / their* 32 **A1** for 413	Evidenced by at least 3 from 502.5, 3606, 4004, 4203. 900.5 or figs 13216 seen. '*their* 32' requires evidence

9	(a)	36 mins www	3	**M1** for [Sue] = 2 [hours] and **M1** for [Jim] = 2·6 [hours] Or **M2** for 0.6 If M0, allow SC1 for 130/65 or 2 mins or 200 mins or 130/50	
	(b)	(i) £14·36	2	**M1** for 130/10·4 or 12.5 **A1** 14.30 to 14.38 Allow 2 marks for 14.93 to 14.94 from 13 x 114.9 Allow **M1** for 1430[...] to 1438[...] or 1493[...] to 1494[...]	
		(ii) £17·37 to 17·38 FT (b)(i)	2	**M1** for *their* (i) × 0.21 **A1** FT *their* (i) **rot**	Allow **M1** for eg 10% 10% 1% with either 10% or 1% correct (**rot**) NB Examiners to multiply 1.21 × their (b)(i) for 2 marks (**rot**). Condone any number of sig figs.
10		213·7 to 213·8(4..) www	3	**M1** for (C =) 26·3 to 26·4 seen or (C =) 2 × π × 4·2 seen **M1** for area rectangle = *their* C × 8·1 **A1** for 213 to 214	If give both circumference and area of circle, first M1 may be awarded. For '*their* C' accept 13.1 to 13.2 or π × 4.2. Also, if their C clearly stated as C = 4.2 x 2 or C=π ×4.2² then 2nd M1 may be awarded.
11	(a)	[*x* =] 4*y*	1		Allow 4 × *y*
	(b)	[*x*=] $\dfrac{y+7}{5}$ or $\dfrac{-y-7}{-5}$ or $\dfrac{y}{5}+\dfrac{7}{5}$	2	**M1** for 5*x* = *y* + 7 oe (eg *y*/5 = *x* - 7/5)	Allow **SC1** for *y* + 7/5 or *y*/5 + 7 or $\dfrac{y-7}{5}$ or *y* + 7 × 5

7

12		2 trials from 2.7 to 2.8 evaluated with one giving outcome less than 15 and one greater than 15.	M2	**M1** for one value of x between 2 and 3 (not 2 or 3) correctly evaluated.		
		2·7 dependent on M1 and evaluation of correct expression	A1	If M0, **W1** for 2·7		

Table for question 12:

x	$x^3 - 2x$
2.1	5.061
2.2	6.248
2.3	7.567
2.4	9.024
2.5	10.625
2.6	12.378
2.7	14.283
2.8	16.352
2.9	18.569
2.75	15.296

If M0 and W0 then **SC1** for an expression with at least 2 terms tabulated and evaluated for 2 values of x.
eg $x^3 - 2$ evaluated for $x = 2.3$ and $x = 2.4$.

Accept **rot** (including integers)

accept trials of $x^3 - 2x - 15 = 0$

13		8·48 to 8·49 www	4	**M3** for √72 or 8.4... Or **M2** for (their 14/2)² + h² = 11² or better Or **M1** for use of Pythagoras' theorem with 11cm and 7cm **A1** 8.5 dependent on M2 or M3	Eg 11² + 7² seen

Section B Total: 25